

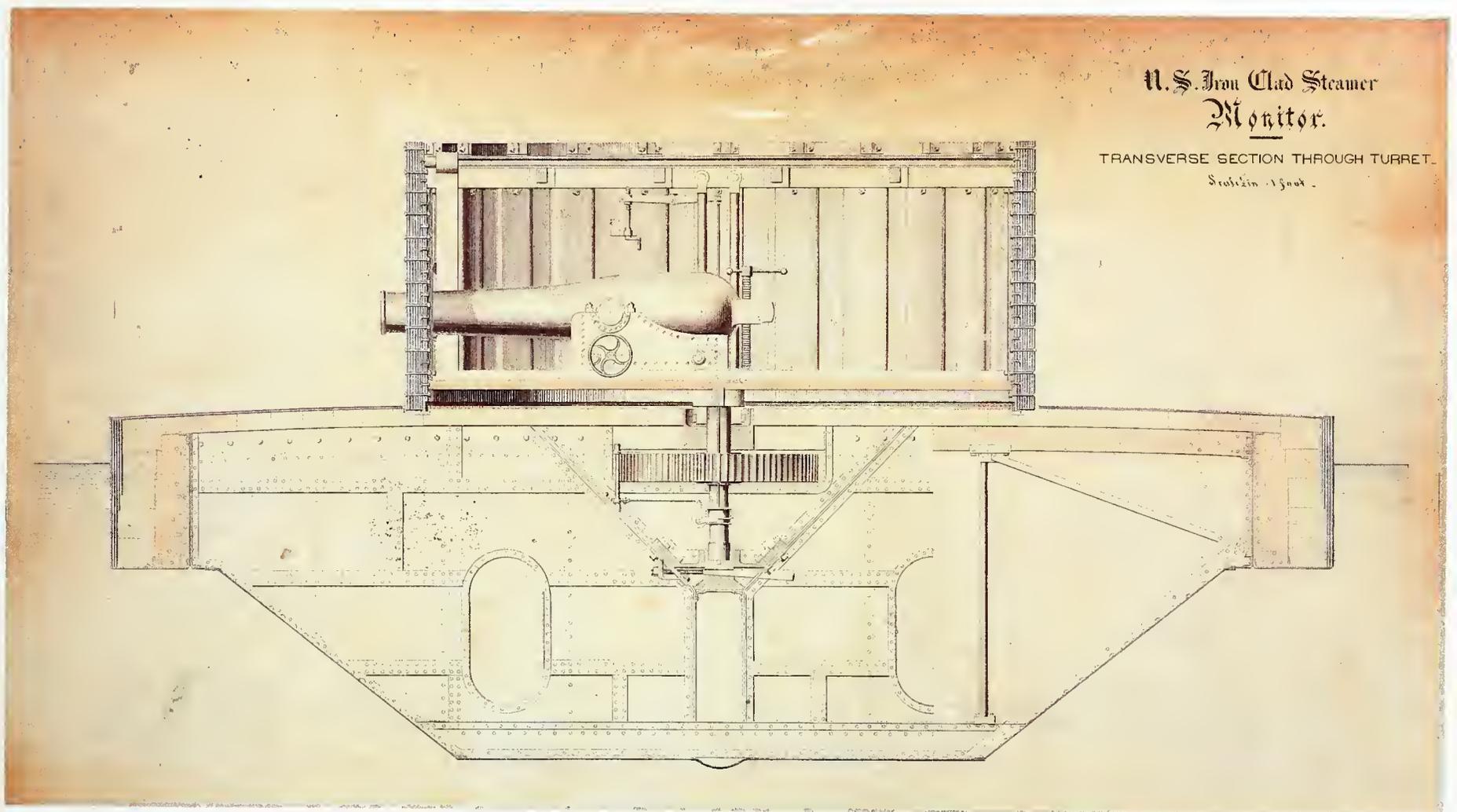
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DRAWINGS OF THE U.S.S. MONITOR



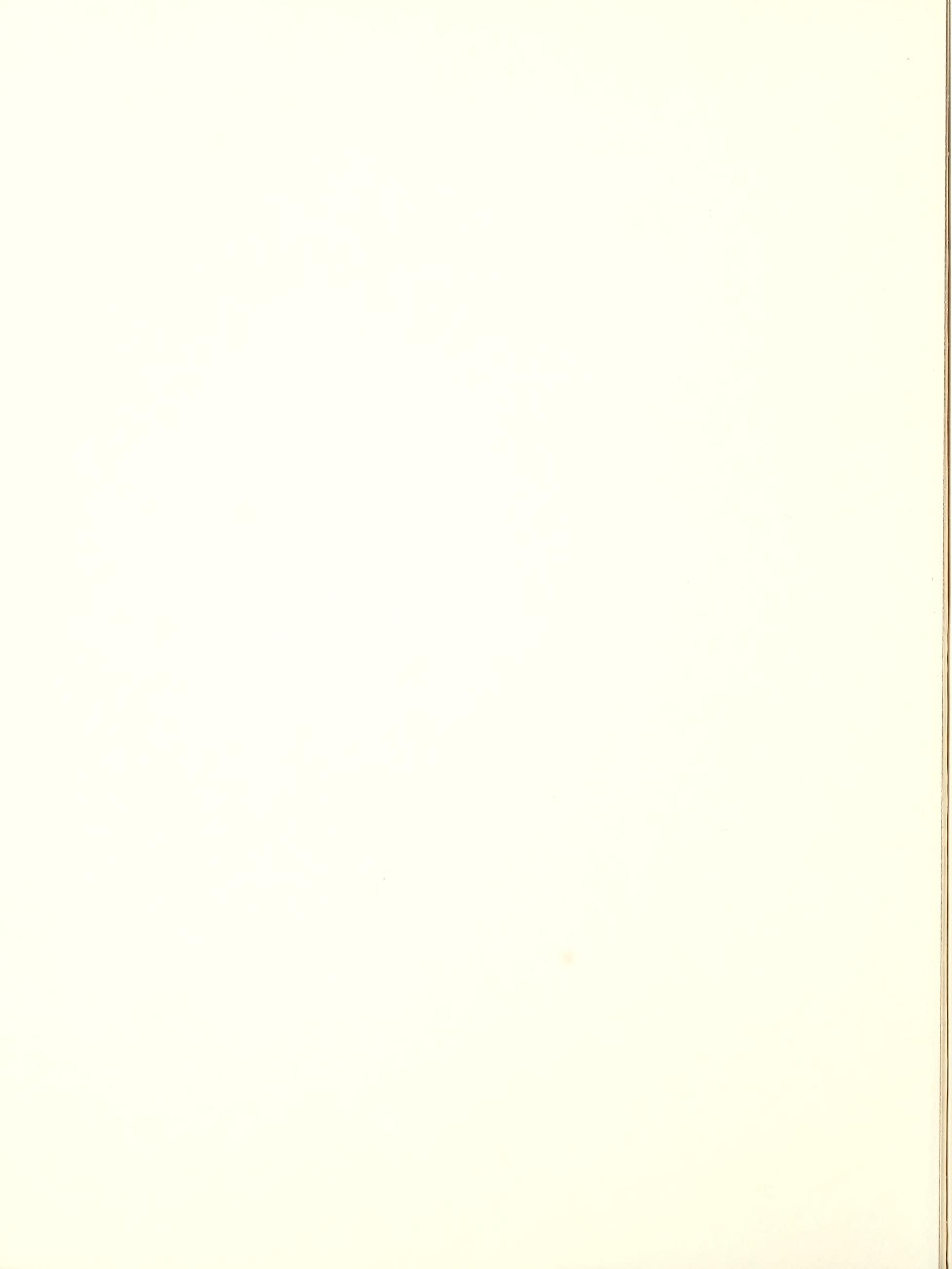
U.S.S. MONITOR
HISTORICAL REPORT SERIES
Volume 1, Number 1
December 1985
BY
Capt. Ernest W. Peterkin, USNR (Ret.)



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DRAWINGS
OF THE
U.S.S. MONITOR



DRAWINGS OF THE U.S.S. MONITOR

A CATALOG AND TECHNICAL ANALYSIS

Prepared for the

Division of Archives and History
Department of Cultural Resources
State of North Carolina

Sponsored by the

Sanctuary Programs Division
National Ocean Service
National Oceanic and Atmospheric Administration
Department of Commerce

by

Capt. Ernest W. Peterkin, USNR (Ret.)

30 December 1985

U.S.S. Monitor, Historical Report Series, Vol. 1, No. 1, 1985



United States Department of Commerce
National Oceanic
and Atmospheric Administration
National Ocean Service
Washington, D.C. 20235



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Department of
Cultural Resources
Raleigh, N.C. 27611

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To the men who had the imagination,
knowledge and skill to produce these
drawings and the *Monitor*.

PREFACE

This study was undertaken to assist the National Oceanic and Atmospheric Administration and the Division of Archives and History, Department of Cultural Resources of the State of North Carolina in the identification and understanding of the surviving engineering drawings of the U.S.S. *Monitor*, and thereby provide a basis for the analysis of the condition of the wreck and the planning of future archaeological programs in the *Monitor* National Marine Sanctuary. As a result of this study, 207 historic drawings have been assembled describing the U.S.S. *Monitor* concept spanning 125 years from the early efforts of John Ericsson to the ongoing interests of modern ship model builders. The range of drawings collected includes sketches in correspondence, newspapers, magazines and book articles and both working and final engineering drawings by the designer of the *Monitor*, John Ericsson, his staff and the draftsmen of the Continental Iron Works. Each drawing has been documented to the extent possible. A complete understanding of a few must wait upon further examination of the wreck site. It is hoped that this collection will stimulate the search for and discovery of additional material of this nature.

In searching for material for this study my efforts were simplified greatly by the pioneering work done by Edward M. Miller who located the drawings in the MacCord Collection at the Stevens Institute of Technology and identified most of the extant drawings in the National Archives during his management of *Project CHEESEBOX* at the U.S. Naval Academy. Others to whom I am indebted for their assistance are: Dr. Philip K. Lundeberg, Curator, Howard P. Hoffman, and Harold Ellis of the Naval History Division at the Smithsonian Institution for making available the Griswold Collection and the drawings of the Swedish Archives and Dr. Robert M. Vogel, Curator, Heavy Machinery and Civil Engineering, for information on Gustavus Weissenborn; Mr. John O. Sands, for his inspiration leading to the Coykendall Collection, and Mr. Ardie L. Kelly, Librarian, of the Mariners Museum; Mr. Charles Haberlein and Mrs. Agnes Hoover of the Photographic Section, for making available the photographic records of the Navy, and Mr. John Vajda, Librarian, the late Commander Terry Allen Damon, USN (Ret.), Director and Dr. Oscar Fitzgerald, Acting Director of the Navy Memorial Museum of the Naval Historical Center; Miss Lynn Malmgren, Director, Miss Anna-Kristin Bohlin, and Charles L. Seeburger of the American-Swedish Historical Foundation Museum for their cooperation in allowing me to examine the John Ericsson papers and their kind permission to allow the use of their large color drawings of the *Monitor*: Professor Nevitt of the Webb School of Naval Architecture; Mr. John Newton, Mr. Everett F. Britz, Jr. and Mrs. James A. Miller of the *Monitor* Research and Recovery Foundation for their assistance in locating the Rowland Collection; Mr. William A. Baker, Naval Architect; Rear Admiral Lauren S. McCready, USMS (Ret.), Mr. Charles S. Schwartz, and Mr. Robert E. Gustafson for their assistance in interpreting various aspects of the *Monitor*'s machinery; Mr. Richard Widdecombe and Mrs. Jayne G. Hartye of the S.G. Williams Library of the Stevens Institute of Technology for their inventory and use of the *Monitor* drawings in the MacCord Collection; Mr. Richard Koke and Miss Wendy Shadwell of the New York Historical Society Museum; Mr. Dana M. Wegner, Curator of Ship Models for the Navy; Mr. Thomas E. Tragle, Jr. for his assistance in interpreting the mysteries of the ship's external features and obtaining biographical data on Sumner Bradford Besse; Mr. Michael P. Musick, Mr. Robert Matchette, and Miss Maida Loescher of the Old Army-Navy Records Section and Mr. Edward Schamel, Center for Legislative Archives of the National Archives for locating drawings and related documents in their records; Dr. Richard Mathieu of the U.S. Naval Academy, Mr. James Cheevers and Mr. Robert Sumrall of the Academy Museum and Miss Alice S. Creighton, Head, Special Collections of the Nimitz Library for use of

the Keeler Papers; Mr. David J. Lyon, Department of Ships, National Maritime Museum, Greenwich, and Commander J.R. Baske, RN (Ret.) of the S.S. *Great Britain* Project in England; Mrs. Gunilla Alfred for interpreting the captions of the drawings in the Swedish Archives; Professor Emeritus Lynn M. Case, University of Pennsylvania for providing information on resources in the French Archives, Mr. Michel Lydon of the *Monitor* Maritime Society and Mr. Irwin M. Berent of Norfolk, Virginia.

Others who assisted in the photographic recording of the drawings were Mr. Richard Sibley of the Naval Intelligence Photographic Center and the Westinghouse Corporation for the MacCord Collection; Mr. George C. Henderson of the Photographic Laboratory of Brown University for the Coykendall Collection; Mr. Robert Golding of Berry and Homer of Philadelphia for the drawings in the American-Swedish Historical Foundation Museum; Mr. Robert Koropp of Denver for the Rowland Collection; and Mr. Claude E. Pertone of the National Geographic Society for his advice and assistance in photographic techniques.

I am especially grateful to the descendents of Thomas Fitch Rowland, the owner of the Continental Iron Works and builder of the *Monitor*, for their wholehearted cooperation and generosity in making available their knowledge and records and express my appreciation to Miss Mary Esther Rowland, lineal granddaughter, for her retrieval of important records and the *Monitor* drawings when the company was dissolved in the 1920's; Mr. Robert Rowland Coykendall, great-great-grandson, for his boyhood zeal in preserving the drawings in his family's possession and his trust in my use of his collection; and Mr. Thomas Fitch Rowland, Jr., lineal great-grandson, for his willingness to share his important collection of drawings. I am indebted to Mr. Nicholas D. Ward, great-grandson of Cornelius Henry Delamater, for information on the Delamater Iron Works.

This study would not have been possible without the support of Mr. Edward M. Miller, now Project Manager, *Monitor* Marine Sanctuary, Sanctuary Program's Office, National Ocean Service and Dr. Richard J. Podgorny of the National Oceanic and Atmospheric Administration. I am also indebted to the members of the Underwater Archaeology Unit of the Division of Archives and History of the State of North Carolina; Mr. Gordon P. Watts, Jr. for his encouragement and interpretation of the *Monitor* wreck site; Mr. James A. Pleasants for his review of microfilm records of the National Archives and the American-Swedish Historical Foundation Museum; Mrs. Dina Hill and Miss Diana Lange; and Ms. Barbara L. Brooks for assistance in processing the manuscript for publication.

Ernest W. Peterkin

Camp Springs, Maryland
30 December 1985

1. COLLECTION OF DATA

Considering the fact that John Ericsson, the designer of the *Monitor*, had ordered his personal papers destroyed after his death, it is remarkable that so many of the engineering drawings of the ship are still preserved, despite the popular opinion to the contrary. Although a large portion of the material for this study was in the possession of the author, including copies of the holdings of the Naval Historical Center, the MacCord Collection of the Stevens Institute of Technology, and those of the National Archives, as compiled by Miller for his *Project CHEESE-BOX*¹, there remained the task of locating unpublished drawings held by various museums, organizations, and individuals and establishing the provenience of all of the material, where possible. These objectives were undertaken by visits, telephone calls, and correspondence with the following organizations and individuals over a period of almost six and a half years from June 1978 to December 1984.

INSTITUTIONS

American-Swedish Historical Foundation Museum

Miss Lynn C. Malmgren, Director
1900 Pattison Avenue
Philadelphia, Pennsylvania 19145

Six Drawings – Contained in the two “John Ericsson Rooms” in wall displays and the original John Ericsson Papers.

Archives du Ministère des Affaires Étrangères

Paris, France

One Drawing – Capt. Gautier’s report of the battle between the U.S.S. *Monitor* and the C.S.S. *Virginia*.

The Mariners Museum

Mr. John O. Sands, Assistant Director for Collections
Mr. Ardie L. Kelly, Librarian
Newport News, Virginia 23608

Three Drawings – One from the C. F. Bailey Collection and two Besse drawings made in 1934.

The New York Historical Society Museum

Mr. Richard J. Koke, Curator of the Museum
Miss Wendy Shadwell, Curator of Prints
170 Central Park West
New York, New York 10024

One Drawing – A collage of the testimonial to Thomas Fitch Rowland.

Stevens Institute of Technology

Mr. Richard Widdecombe, Librarian
Mrs. Jayne G. Hartye, Special Collections
S. G. Williams Library
Castle Station
Hoboken, New Jersey 07030

Seventy-six Drawings – Part of the MacCord Collection of drawings retrieved from John Ericsson's estate.

National Archives

Washington, D. C. 20408

Twenty-eight Drawings – Plans and sketches from record groups 19, 45, 46, 71 and 74.

U. S. Naval Academy Museum

Mr. James Cheevers, Curator of Diverse Collections
Annapolis, Maryland 21402

Two Drawings – Sketches from the *Monitor's* Paymaster, William F. Keeler.

Naval Historical Center

Mr. Charles Haberlein, Head, Photographic Section
Washington Navy Yard
Washington, D.C. 20374

One Drawing – An assembly drawing of the 11-inch gun carriage.

Naval Research Laboratory

Technical Information Division
Washington, D. C. 20375

One Photograph – Dimensioned section of a hull plate recovered from the *Monitor* wreck in 1974.

Smithsonian Institution

Dr. Philip K. Lundeberg, Curator
Division of Naval History
National Museum of American History
Washington, D. C. 20560

Ten Drawings – Four drawings from the Swedish Archives and six drawings on plating lists from the Griswold Collection.

INDIVIDUALS

Robert Rowland Coykendall

Four Drawings – Photographs of two general plans and a transverse section from the records of the Continental Iron Works and a sketch of the stern brace from a letter from John Ericsson to Thomas Fitch Rowland.

Thomas F. Rowland, Jr.

Forty-seven Drawings – Working and finished drawings from the records of the Continental Iron Works.

Dana M. Wegner

Two Drawings – A reconstruction of general plans and details made in 1971.

PUBLICATIONS

Allenson, George. "The Monitor," *Model Craftsman*, 5 (February, 1937).

Four Drawings – General plans, transverse section of hull, turret, and main engines.

Bennett, Frank M. *The Steam Navy of the United States* Pittsburgh: Warren and Company, 1896.

Two Drawings – A general plan of the ship and boiler.

Church, William Conant. "John Ericsson, The Engineer," *Scribner's Magazine*, VII (January-June, 1890).

Two Drawings – Ericsson's concepts of an "aquatic weapon."

Ericsson, John. "The Building of the Monitor," *Battles and Leaders of the Civil War*, Vol. 1, R.U. Johnson and C.C. Buell, eds., New York: Century Company, 3 volumes, 1887.

Four Drawings – An inboard profile, berth deck plan, and two transverse sections.

_____. *Contributions to the Centennial Exhibition*, New York: "Nations" Press, 1876.

Six Drawings – An early concept, general plans, main engine and gun carriage.

Greene, Dana S. "In the 'Monitor' Turret," *Battles and Leaders of the Civil War*, Vol. 1. R.U. Johnson and C.C. Buell, eds., New York: Century Company, 3 volumes, 1887.

One Drawing – Outboard profile and deck plan.

Harper's Weekly. "Ericsson Steel-Plated Battery," V (December 21, 1861).

One Drawing – Inaccurate deck and transverse section plan.

_____. "The Monitor," VI (March 29, 1862).

One Drawing – General plan and transverse section of hull.

Isherwood, B.F. *Experimental Research in Steam Engineering*, Philadelphia: Hall of the Franklin Institute, Volume 1, 2 volumes, 1863.

One Drawing – Elevation of the front and side of boiler.

Russell, John Scott. *The Modern System of Naval Architecture*, London: Day and Son, 3 volumes, 1864.

One Drawing – Inboard profile, below-deck arrangements, and transverse section.

U.S. Navy Department. *Ordnance Instruction for the United States Navy*, Washington: Government Printing Office, 1866.

One Drawing – Dahlgren's shell gun.

Warner, Oliver. *Great Sea Battles* New York: Macmillan Company, 1963.

One Drawing – Inaccurate newspaper representation of the general plan.

The collection of this catalog represents contributions from ten institutions, three individuals and twelve publications.

2. ORGANIZATION OF THE CATALOG

The drawings have been arranged according to their function to make the catalog more useful for understanding the construction of the *Monitor*, and each has been assigned a sequential number. The categories of functions and associated catalog numbers are:

Category	Catalog Numbers
Early Concepts	1-7
General Plans and Arrangements	8-40
Transverse Sections and Bulkheads	41-87
Stern Arrangements, Main Deck Armor and Anchor Well	88-99
Ground Tackle	100
Boilers and Fittings	101-106
Main Engine, Shafting and Propeller	107-132
Auxiliary Machinery	133-141
Scantlings	142-148
Hydrostatic Characteristics	149-154
Steering Gear	155-157
Navigation Equipment	158-159
Turret	160-183
Ordnance	183-205
Miscellaneous	206-207

Each drawing is accompanied by a data sheet that provides:

Title – The original is used, if available. If the original drawing has no title, one has been derived. Original titles are written in upper case letters and are set off in quotation marks. New titles are written in lower case letters without quotation marks.

Date of Subject – This is the date or time period represented by the drawing. If not found on the drawing, an estimate is provided.

Medium – The medium includes the drawing instrument, the colors of ink, the drafting surface, or the reproduction technique. i.e., lithograph, etching, etc.

Draftsman – The draftsman's name and life dates are given, when known.

Size – The dimensions of the writing or reproduction surface are given in inches with the height first followed by the width. "Sheet" size gives the dimensions of the outside edges of the drawing or printing surface. "Sight" size includes the extreme dimensions of the image. Many of the dimensions of the drawings have been computed from the scale and marked dimensions, as some of the original drawings were not available for extended examination. In these cases, the dimensions have been estimated and are annotated by the note, "est."

Title Block/Caption – When a title has been translated, the original title has been listed here. When a caption accompanying the title is lengthy, its contents are also placed under this item.

Scale – Either the actual or estimated scale is placed here. The scale is expressed in inches or fractions of inches per foot.

Notes – These include annotations made on the drawings, especially when they are difficult to read or require interpretation.

Signature/Initials – The draftsman's signature is shown here, or, in the case of the MacCord Collection, the creditation made by MacCord. The drawings of the MacCord Collection have two sets of annotations, probably made at different times; one in pencil and another in ink.

Rendered – Unless recorded on the drawing, a date has been estimated.

Original – Where possible, the location of the original drawing and its condition are described. The condition of the MacCord Collection drawings was based on the information obtained from their inventory².

Publication – When the drawing has been published, the document reference is listed.

Remarks – Comments are provided here on the function of the object and its relationship to other drawings and the provenance of the subject.

Appendix A contains the list of drawings. The drawings and their descriptions are cataloged in Appendix B. The index of drawings by source is shown in Appendix C.

3. THE DRAFTSMAN

A brief account of the draftsmen and the number of drawings they contributed to the catalog follows:

Sumner Bradford Besse (1902—) — Two drawings. Besse is a 1926 graduate of naval architecture from the Massachusetts Institute of Technology, and a retired, professional model builder for the Newport News Shipbuilding and Drydock Company. His noted work in the models of the U.S.S. *Monitor* and C.S.S. *Virginia* is displayed at the Mariner's Museum.

Charles H. Corbett (Life dates unknown) — One drawing. A vice-president of the Continental Iron Works at the time of the death of Thomas Fitch Rowland, who was the president and owner of the yard where the *Monitor* was constructed. Corbett supervised the preparation of the *Monitor* "collage" made in memory of Rowland in 1908³.

Endicott and Company — One drawing. A New York lithographing firm that made many renditions of the monitor-class vessels during the Civil War.

John Ericsson (1803-1889) — Fifty-one drawings. The designer of the *Monitor*. He provided almost all of the conceptual drawings of the *Monitor* during its construction.

Gantie (life dates unknown) — One drawing. Commander from the *Gassendi* who may have rendered the French version of the *Monitor*.

William Frederick Keeler (1821-1886) — Two drawings. Paymaster of the *Monitor* during the entire life of the ship. His letters and sketches to his wife, Anna, provide unique insights to the exterior and interior of the vessel.

Charles William MacCord (1836-1915) — Thirty-seven drawings. A native of the State of New York and a graduate of Princeton University, MacCord became involved in drafting in New York City with a Captain Montgomery and soon after became an assistant draftsman at the Delamater Iron Works. Here he met Captain John Ericsson and was "borrowed" to assist in the work on Ericsson's Caloric Engine. He remained for nine years, executing many of the working and finished drawings for the *Monitor*. In 1868 he became chief draftsman for General McClellan's Department of Docks in New York, but soon became the head of the Department of Drawings at the newly formed Stevens Institute of Technology in Hoboken. At Ericsson's death he rescued from destruction by the executor of Ericsson's estate the 76 drawings of the *Monitor* preserved in the S.G. Williams Library of the Stevens Institute of Technology.⁴

Isaac Newton (1837-1884) — One sketch. First Assistant Engineer of the *Monitor*. He was responsible for the many constructive suggestions for the modification of the ship. He was one of the celebrated heroes of the engagement with the C.S.S. *Virginia*.

Ernest Wilson Peterkin (1920—) The author of this study and a retired engineer from the Naval Research Laboratory. Dimensioned a photograph of a section of a hull plate recovered from the wreck of the *Monitor* in 1977 and transcribed lists or drawings from Chester Griswold Collection of the Smithsonian Institution.

Thomas Fitch Rowland (1831-1907) — Three drawings. Rowland was the engineer the “Battery Associates” selected to build the *Monitor* and owner of the Continental Iron Works where the ironclad was assembled from October 1861 to February 1862. Previously superintending engineer of the Allaire Works, he had been building iron ships since 1859. When he took the *Monitor* contract he had just completed outfitting Admiral David D. Porter’s mortar schooners with firing platforms. His experience and shipbuilding facilities were ideal for construction of “Ericsson’s Battery.”

Commodore Joseph Smith, USN (1790-1877) — One sketch. Chief of the Bureau of Yards and Docks and cognizant officer for the *Monitor* contract. His correspondence with Ericsson during the building of the ship included a sketch of his concept for the redesign of the *Monitor*’s midship section.

Chief Engineer Alban C. Stimers, USN (1827-1876) — One drawing. Superintendent for the construction of the *Monitor*, he played a vital role in the building of the ship. Stimers was the turret officer during the engagement with the C.S.S. *Virginia* after the executive officer, Lieut. S. Dana Greene, relieved the wounded captain of the *Monitor*, Lieut. Worden. Assigned as the Inspector of Ironclads, he was heavily involved in the expansion and maintenance of the ironclad fleet. He left the Navy after his unsuccessful design attempt with the light-draft monitors.

Dana M. Wegner (1947—) A ship enthusiast who has worked with the Smithsonian, Admiral Rickover’s office, the National Archives, and is now Curator of Ship Models for the U.S. Navy. His drawings of the *Monitor* were made in 1971 for the International Plastic Modellers Society.

Gustavus Weissenborn (Life dates unknown) — One drawing. Weissenborn was a civil engineer of the C. & E. Weissenborn Engineering Office, 131 Fulton Street, New York⁵. This company produced engravings of engineering subjects. Very little is known of this draftsman; however, he is mentioned in the inventory of the MacCord Collection as the draftsman for a “Transverse Section Through the Turret” and in the Griswold Papers in the Smithsonian⁶.

C. Wright (Life dates unknown) — One engraving. An engraver for a transverse section of the hull through the fireroom that appeared in the *Century Magazine* of 1886.

Unknown Draftsmen — The draftsmen for 101 drawings have not been identified.

John Ericsson had a number of draftsmen engineers in his employ and some were identified⁷ by his private secretary, Samuel W. Taylor, as:

Samuel Risley ⁸	1839- ?
Charles William MacCord	1859-1868
Valdemar F. Lässoe	1862-1889
Alexander Pollock	1862-1866
George Van Wagenen	1862-1866
Jacob George Arnold Meyer ⁹	1870-1871
Andrew Swinton	1872-1885

Unfortunately, the draftsmen of several of the most important drawings of the catalog remain unidentified. One drawing, a transverse section of the hull through the turret, Catalog Drawing 44, has been identified as a black and white lithograph by Gustavus Weissenborn. Two other drawings of this transverse section, Catalog Drawings 43 and 45, are rendered on tracing cloth in colored inks and show almost identical renditions with very slight differences in shading techniques. Two drawings of the “General Plan,” Catalog Drawings 14 and 15, have the same characteristics of these transverse sections and may have been drawn by the same draftsmen. From the skill and techniques exhibited by MacCord in his drawings in this catalog and by those done by Lässoe¹⁰ in his renditions of the hand-propelled “Swedish Gunboat,” which he made for Ericsson in the period 1867-1869, Catalog Drawings 14, 15, 43 and 45 could have been made by either MacCord or Lässoe.

The index of drawings by draftsmen appears in Appendix D.

4. TECHNICAL ANALYSIS

The author's comments have been entered in the "Remarks" section of each data sheet to describe the subject of the accompanying drawing and, where applicable or possible, its relationship to other drawings. Many of the drawings and titles are obscure and it has been necessary to make three-dimensional sketches of the objects to reveal their shape and interpret their function¹¹. Because of the lack of documentation on many of the drawings, it is difficult or impossible to determine when the final configuration of the object is represented. This section has also been used to note discrepancies between drawings and historical evidence.

5. CONCLUSIONS

A claim has been made that Ericsson executed over 3000 drawings for the construction of the *Monitor*¹². Assuming 135 days elapsed between his early efforts on the contract in mid-September 1861 and the launching of the *Monitor* on January 30, 1862, Ericsson would have had to produce an average of twenty-two drawings a day during the entire period, a prodigious but unlikely output for a draftsman of even Ericsson's energy and ability. The number 3000 comes from a statement by Cornelius S. Bushnell, one of the "Battery Associates," to Secretary of the Navy Welles that Ericsson produced drawings for 3000 "parts" of the monitor, U.S.S. *Dictator*¹³ and over 100 drawings for the U.S.S. *Monitor* by his own hand¹⁴.

- Of the 207 drawings of this catalog, 152 could have been produced for the *Monitor*'s construction during the period of her building. A fairly complete set of drawings for the U.S.S. *Tecumseh* is represented by about 100 drawings. While there is no known record of all drawings produced for the *Monitor* by Ericsson, the Continental Iron Works, and all of the subcontractors, it is probable that no more than 300 drawings were required for an adequate engineering description for the building of the *Monitor*. The 152 drawings of that qualification in this catalog would represent, therefore, a survival rate of over 50 percent. A liberal interpretation could mean that perhaps one-half of the original drawings of the *Monitor* have survived.

- This number of drawings, along with the remains of the vessel, should provide the basis of a fairly comprehensive description of the ship's configuration. Although there is a large body of graphic information represented, there are still appreciable gaps in the information concerning many areas of the vessel, namely:

- Hull and deck plating arrangements
- Hatch and deck fittings
- Anchor hoister and chain lockers
- Ground tackle
- Cabin and stateroom joinery
- Crew berthing and storeroom designation and arrangements

- Magazine and shellroom construction, lighting and flooding arrangements
- Turret engine drive, gearing and controls
- Engine room machinery piping layout and valves
- Fresh water tanks
- Engine room instruments, tools, and storage facilities
- Auxiliary machinery layout, piping and valves
- Inventory and location of supplies and ammunition

• Despite the number of drawings representing the general arrangements of the *Monitor*, there are no accurate or complete drawings of the ship before or during the engagement with the C.S.S. *Virginia*, after the reinforcement of the pilot house on the James River, after the modifications that took place in the Washington Navy Yard, or after the addition of the rifle screen and centrifugal pump at Hampton Roads. A new set of drawings describing the vessel at the time of sinking will be necessary to provide an optimum basis for future archaeological and engineering analyses.

• A great deal of information that would be useful in bridging these gaps has yet to be cataloged from contemporary correspondence, reports, writings, specifications, models, drawings and art of the *Monitor* and other monitor-class ships, as well as a detailed examination of the wreck site. The integration of such data would be a valuable asset for planners considering the feasibility of the recovery of the *Monitor*, assessing its archaeological worth and interpreting the technology of its construction.

6. RECOMMENDATIONS

On the basis of conclusions reached in this study, the following actions are recommended:

- Make this catalog available to planners considering the recovery feasibility and archaeological studies of the *Monitor* wreck.

- Reconstruct the sinking configuration of the *Monitor* as accurately as possible from the drawings of this catalog and other contemporary information to produce, as a minimum, the following drawings:
 - a. Lines
 - b. General Arrangements
 - c. Transverse Sections
 - d. Interior Decks
 - e. Compartmentation of Holds
 - f. Machinery, Piping and Valve Layouts
 - g. Shell Expansion
 - h. Side and Deck Armor Plating
 - g. Turret

- Produce three-dimensional drawings of the ship, compartments, turret, and major components for the use of archaeologists and divers.

- Maintain a continuing search of contemporary records, specifications, drawings, photographs, art and models concerning the *Monitor* and monitor-class vessels to establish a catalog of the physical description of the ship's configuration, components and artifacts.

FOOTNOTES

1. *Project CHEESEBOX*, edited by Edward M. Miller, USN, Annapolis: U. S. Naval Academy, 1974.
2. *Revised Inventory of the Original Design of the Ship, Monitor*, S. G. Williams Library, Stevens Institute of Technology, February 15, 1974.
3. Telephone conversation with Miss Mary Esther Rowland, lineal granddaughter of Thomas Fitch Rowland, February 15, 1979.
4. Franklin DeR. Furman. "Obituary-Charles William MacCord," *Stevens Indicator*, Vol. XXXII, No. 2, Stevens Institute of Technology, April 1915.
5. Gustavus Weissenborn. *American Engineering*, Part 1, No. 1, New York: G & E Weissenborn Engineering Office, 1857.
6. Chester Griswold Collection. Smithsonian Associates No. 90398, *Archival Manuscripts of the Smithsonian Institution*, National Archives, Unpublished Manuscript.
7. Court testimony, Samuel W. Taylor, New York, November 28, 1890. John Ericsson Papers, American-Swedish Historical Foundation.
8. Porter H. F. J. *The Delamater Iron Works*, New York: The Art Press, 1918.
9. Private correspondence, Michael Lydon to author, ca. 1979.
10. Drawings 74, 75, and 80, "Auxiliary Drawings — Not Necessarily of *Monitor*," *Revised Inventory of the Original Design of the Ship, Monitor*, S. G. Williams Library, Hoboken: Stevens Institute of Technology, 1974.
11. Ernest W. Peterkin. *Sketches and Notes of the Engineering Drawings of the U.S.S. Monitor* (Unpublished Manuscript), 1979-1982.
12. Esther Chilstrom Maisner. *Guide to the Microfilm Edition of the John Ericsson Papers*, Philadelphia: American-Swedish Historical Foundation, 1970.
13. William Conant Church. *The Life of John Ericsson*, Vol. 1, New York: Charles Scribners' Sons, 1890, p. 252.
14. *Ibid.*, p. 260.

APPENDIX A
The List of Drawings

LIST OF DRAWINGS

Catalog Number	Title	Page Number
EARLY CONCEPTS		
1	Ericsson's Concept of His "Sub-Aquatic" Weapon (Charles Scribner's Sons)	35
2	Details of Ericsson's Original <i>Monitor</i> Concept (Charles Scribner's Sons)	37
3	"PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA./PRESENTED TO THE EMPEROR NAPOLEON III,/IN THE YEAR 1854." (National Archives)	41
4	"PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA./PRESENTED TO THE EMPEROR NAPOLEON III,/IN THE YEAR 1854." (National Archives)	43
5	"IRON-CLAD CUPOLA VESSEL/DESIGNED BY JOHN ERICSSON, 1854/SIDE ELEVATION AND TRANSVERSE SECTION" ("Nation" Press)	45
6	"ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/PLAN AND SIDE ELEVATION" (National Archives)	47
7	"ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/TRANSVERSE SECTION THROUGH CENTRE OF TURRET" (National Archives)	49
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APPENDIX B

The Catalog of Drawings

EARLY CONCEPTS

Numbers 1 - 7

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 1

Title: Ericsson's Concept of His "Sub-Aquatic" Weapon

Date of Subject:

ca. 1826

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium:

Photoengraving

Size [Sheet]:

4 1/2 inches by 4 3/4 inches

Size [Sight]:

4 1/8 inches by 4 3/4 inches

Inscribed:

Title Block/Caption:

"Facsimile of Ericsson's Pencil Drawing of his Monitor, 1854."

Notes:

Mathematical computations with Swedish notations.

Rendered: ca. 1854(?)

Publication:

William Conant Church, "John Ericsson, The Engineer," *Scribner's Magazine*, VII, (January-June 1890), p. 357.

Remarks:

As early as 1826 John Ericsson, ever mindful of the defense of his native Sweden, began thinking about a "sub-aquatic" weapon that would render useless vessels the size of Britain's ships of the line. One of Ericsson's pencil sketches, found among his papers after his death in 1889, shows a low-freeboard, turreted ironclad firing a heavy projectile and an underwater torpedo into a wooden warship with short-range trajectories.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 2

Title: Details of Ericsson's Original *Monitor* Concept

Date of Subject:

ca. 1826

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium:

Photoengraving

Size [Sheet]:

3 5/8 inches by 4 7/8 inches

Size [Sight]:

3 1/4 inches by 4 7/8 inches

Inscribed:

Title Block/Caption:

"Facsimile of a Pencil Sketch by Ericsson, giving a Transverse Section of his Original Monitor Plan with a Longitudinal Section drawn over it."

Notes:

Mathematical computations with Swedish notes.

Rendered: ca. 1854(?)

Publication:

William Conant Church, "John Ericsson, The Engineer," *Scribner's Magazine*, VII, (January-June 1890), p. 356.

Remarks:

The second of two drawings found among Ericsson's papers after his death, this sketch provides the details of the turret system and underwater torpedo. On March 23, 1866, Ericsson wrote in retrospect:

"The great importance of what I call the sub-aquatic system of naval warfare strongly presented itself to my mind in 1826; yet I have not during this long interval communicated my idea to a single person, excepting the Emperor Napoleon III. What I knew twelve years ago, he knows, with regard to the general results of

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 3

Title: "PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA./PRESENTED TO THE EMPEROR NAPOLEON III,/IN THE YEAR 1854."

Date of Subject:

1854

Draftsman/Life Dates:

Unknown

Medium:

Black, blue and red ink on tracing cloth.

Size [Sheet]:

15 1/2 inches by 21 inches

Size [Sight]:

12 1/2 inches by 20 1/2 inches

Inscribed:

Title Block/Caption:

See Title

Scale:

Side Elevation: "1/8" = 1 Foot"

Transverse Section "1/4" = 1 Foot"

Notes:

"Side Elevation of the Battery"

"Transverse Section through centre of the Revolving Cupola"

Rendered: June 1862

Original:

Location:

National Archives

Identification:

Record Group 45, Misc. Letters Received, Navy Department, Vol. 555 (Vol. III), p. 166a (Enclosure), Ericsson to Welles, June 28, 1862.

Condition:

Excellent, fold fragile.

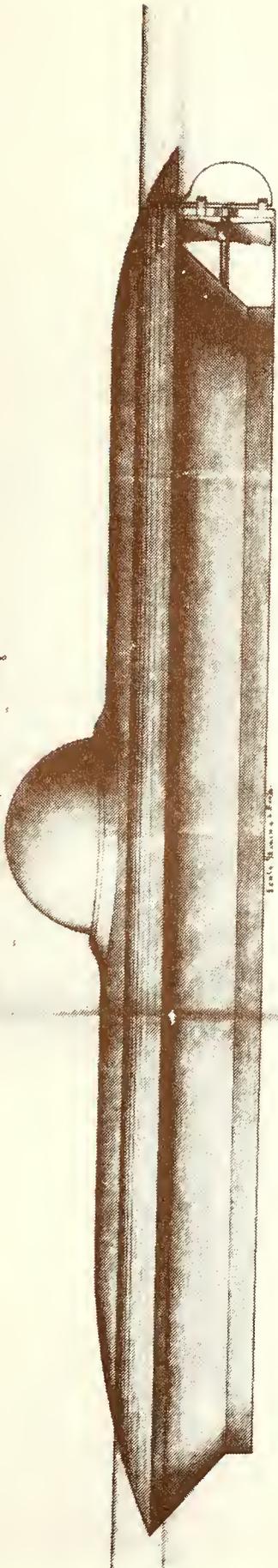
Remarks:

This drawing, which omits the torpedo, was submitted by Ericsson to Secretary of the Navy Gideon Welles on June 28, 1862, refuting the claims of the English government that Captain Coles, RN, was the inventor of the revolving turret "which forms so important a feature of the structure of the United States gunboat, *Monitor*." This ship in the drawing appears to have a length of about 113 feet, a beam of 32 feet, and a draft of 11 1/2 feet. The hemispherical turret was 16 feet in diameter with a wall thickness of 6 inches, was powered by steam, and weighed 40 tons. Air for ventilation was to be drawn through small holes in the turret by the action of a centrifugal blower, while the products of combustion and impure air were forced through conductors leading to small holes in the deck and turret. The use of small holes and reflecting telescopes to view surrounding targets was planned. The vessel was to be composed entirely of iron, and the curved deck plated with 3 inches of iron.

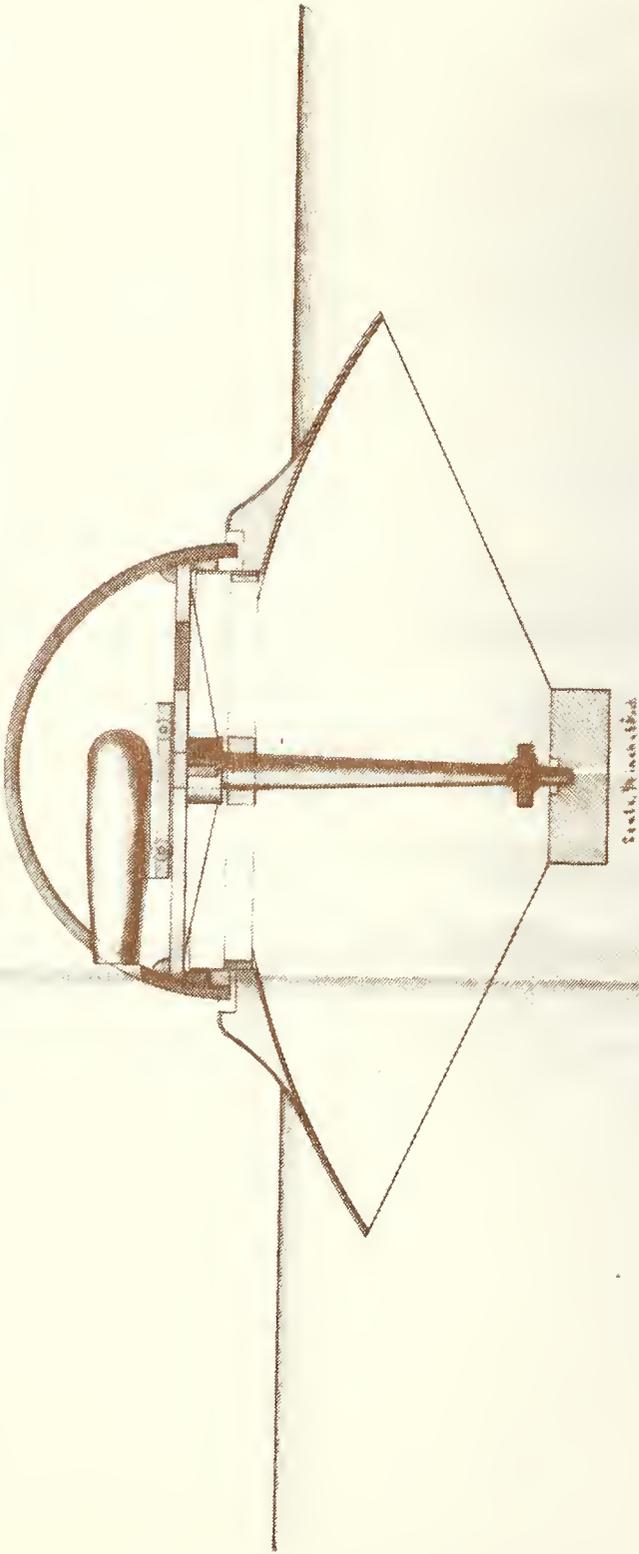
Ericsson's proposal to the French Emperor, Napoleon III, was made on September 26, 1854, two weeks after the French directed the construction of armored batteries for their war with Russia. Although examined closely by the emperor, the design was not exploited by the French.

*Plan of Ericsson's Impregnable Battery and Revolving Cupola.
Presented to the Emperor Napoleon III.
in the Year 1854.*

Side Elevation of the Battery.



Transverse Section through center of the Revolving Cupola.



3. "PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA/PRESENTED TO EMPEROR NAPOLEON III/IN THE YEAR 1854." (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 4

Title: "PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA./PRESENTED TO THE EMPEROR NAPOLEON III/IN THE YEAR 1854."

Date of Subject:
1854

Draftsman/Life Dates:
Unknown

Medium:
Black and red ink on paper.

Size [Sheet]:
7 3/4 inches by 10 1/2 inches

Size [Sight]:
6 inches by 10 1/2 inches

Inscribed:

Title Block/Caption:

"Side Elevation of the Battery"
"Transverse Section through the centre of the Revolving Cupola"

Scale:

Transverse Section: "1/4" = 1 foot"
Side Elevation: "1/8" = 1 foot"

Notes:

Enclosed in label on drawing: "Naval War Records, Secretary's Office, Vol. 555, Page 166b, Copied A. H. E, Verified, 1/2 size of original drawing."
Stamped: "The National Archives of the United States"

Signature/Initials: A. H. E. (?)

Rendered: 1862 (?)

Original:

Location: National Archives

Identification:

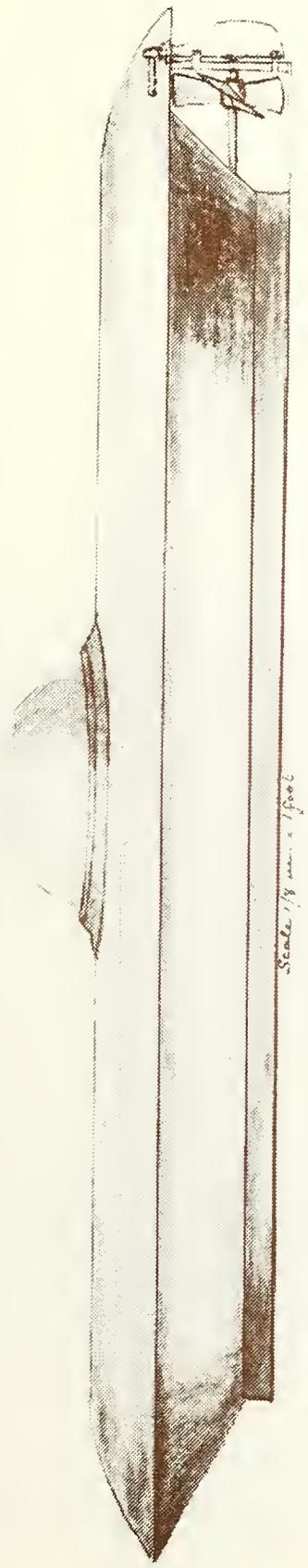
Record Group 45, Office of Naval Records and Library, Subject File 1860-1870, *Monitor*, 1861-1862.

Condition: Good

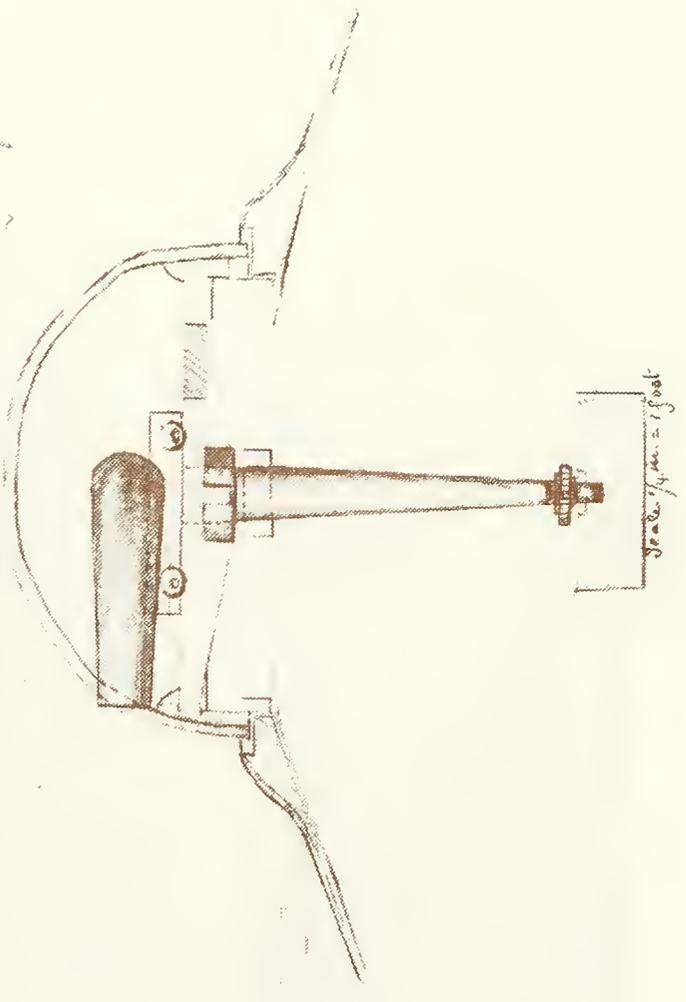
Remarks:

This drawing is a sketch one-half the size of Catalog Drawing 3 and may have been made by the Navy Department.

Plan of Ericsson's Impregnable Battery and Revolving Cupola,
 Presented to the Emperor Napoleon III
 in the year 1854.
 Side Elevation of the Battery.



Transverse Section through centre of the Revolving Cupola



4. "PLAN OF ERICSSON'S IMPREGNABLE BATTERY AND REVOLVING CUPOLA/PRESENTED TO THE EMPEROR NAPOLEON III/IN THE YEAR 1854" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 5

Title: "IRON-CLAD CUPOLA VESSEL/DESIGNED BY JOHN ERICSSON, 1854/SIDE ELEVATION AND TRANSVERSE SECTION"

Date of Subject:

1854

Draftsman/Life Dates:

Unknown

Medium:

Engraving in white line

Size [Sheet]:

10 3/4 inches by 7 1/2 inches

Size [Sight]:

5 inches by 8 inches

Inscribed:

Title Block/Caption: See title

Scale:

None, but side elevation is one-half the scale of transverse section.

Notes:

"Plate 42. See Chap. XXVII"

Rendered: ca. 1876

Publication:

John Ericsson, *Contributions to the Centennial Exhibition*, New York: "Nation" Press, 1876, plate 42.

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, Reel 8.

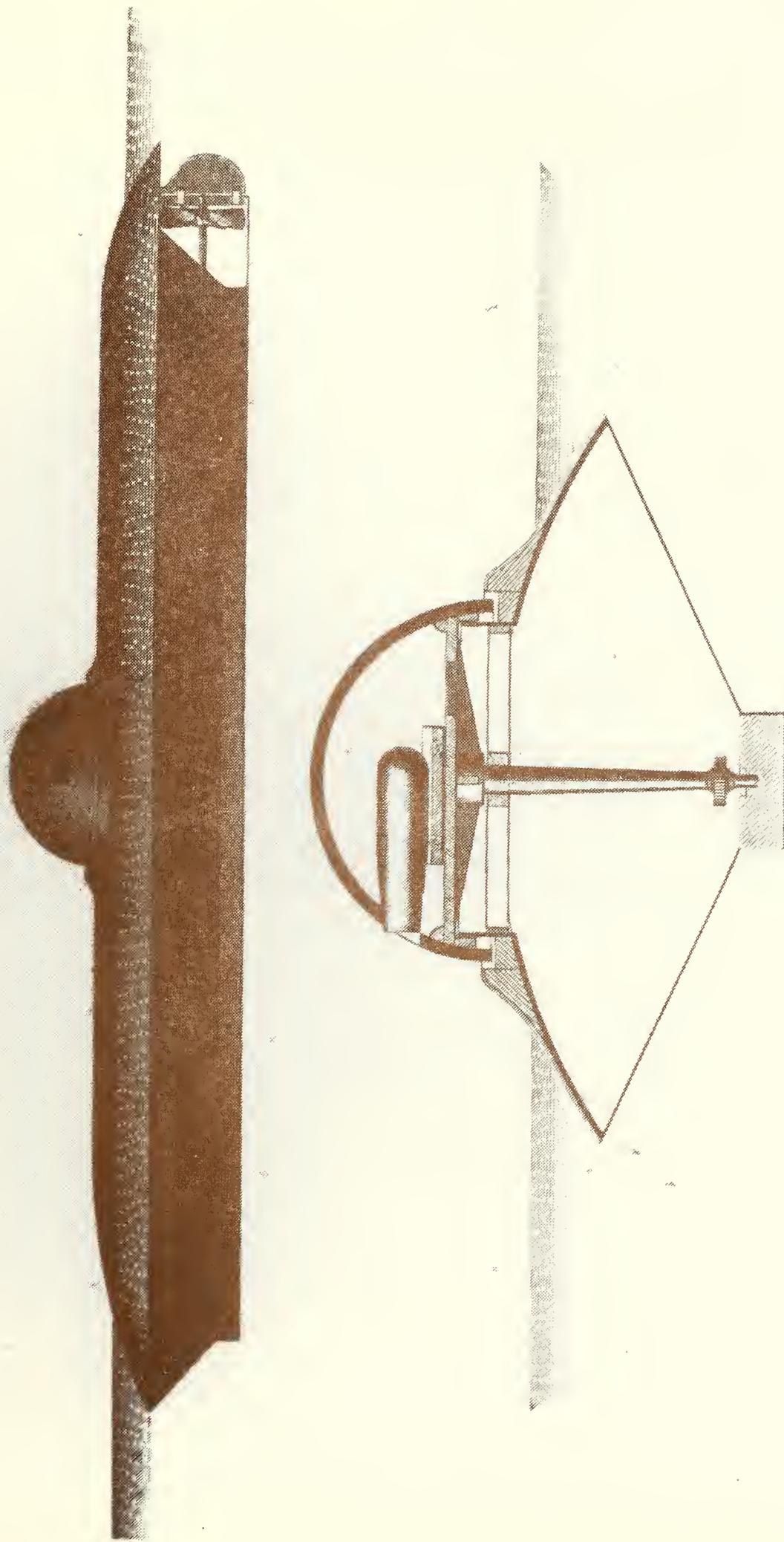
John Ericsson, "The Building of the Monitor", *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New York: The Century Company, 4 volumes, 1887, p. 740. [Side elevation and transverse section.]

Remarks:

This drawing was published originally in *Contributions to the Centennial Exhibition*, but, again, omitted the torpedo.

IRON-CLAD CUPOLA VESSEL. DESIGNED BY JOHN ERICSSON, 1854

SIDE ELEVATION AND TRANSVERSE SECTION.



5. "IRON-CLAD CUPOLA VESSEL/DESIGNED BY JOHN ERICSSON, 1854/SIDE ELEVATION AND TRANSVERSE SECTION" ("Nation" Press)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 6

Title: "ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/PLAN AND SIDE ELEVATION"

Date of Subject:

ca. 28 September 1861

Draftsman/Life Dates:

Unknown

Medium: Black and blue ink on tracing cloth.

Size [Sheet]:

17 inches by 26 1/2 inches

Size [Sight]:

9 3/8 inches by 21 5/8 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/8 inch = 1 foot"

Notes:

"Length of Upper Vessel, 179 ft./Beam of Upper Vessel, 41 feet/Length of Lower Vessel, 106 feet/Beam of Lower Vessel, 35 feet 4 inches/Depth of Upper Vessel, 5 feet/Depth of Lower Vessel, 6 feet 6 inches/Depth of Hold, 10 feet".
Pencil note alongside title: "Monitor/Oct. 1861"

Rendered: Before September 28, 1861

Original:

Location: National Archives

Identification: RG 19, U.S.S. *Monitor*, Plan No. 26-8-20

Condition: Good

Publication:

Edward M. Miller, editor, *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

Remarks:

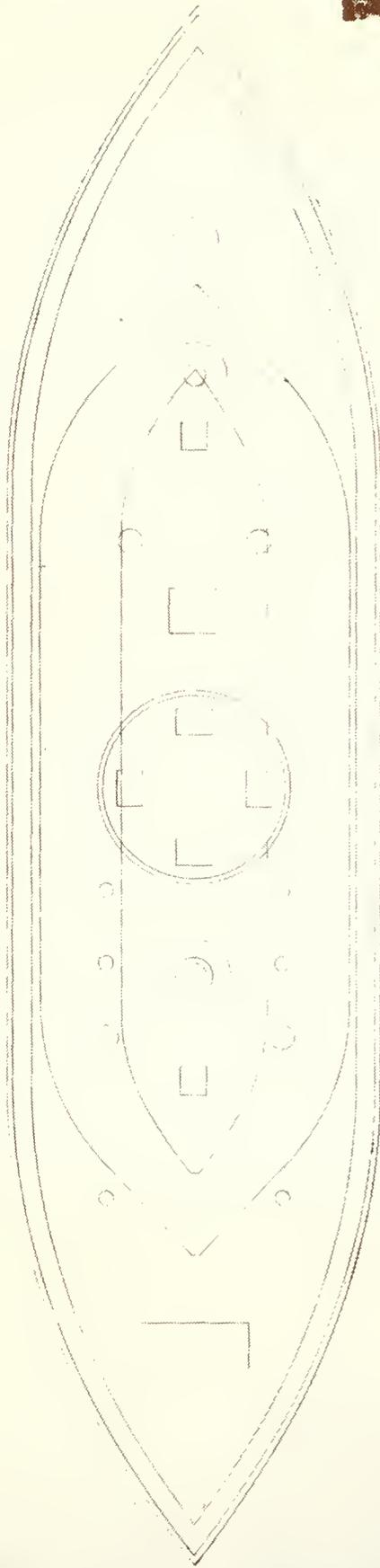
This drawing shows Ericsson's initial concept of his "Ericsson Battery" and agrees with his "Specification" [Ericsson to Smith, September 28, 1861] and as amended [Ericsson to Smith, October 4, 1861]. Many of the features — the 12-inch guns, firing in opposite directions, the hull length and beam, telescoping stack and ventilator, conical pilothouse and stack armor — were not adopted in the original version of the *Monitor*.

Copies of this drawing are also found in the Mariners Museum, #CN-6(1).

Ericsson Battery of two Guns of 12 inch Calibre.

Plan and Side Elevation.

Belmont, 1861.



Length of Battery 100 feet
 Depth of Battery 40 feet
 Height of Battery 10 feet
 Height of Gun 6 feet
 Diameter of Gun 12 feet

6. "ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/PLAN AND SIDE ELEVATION" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 7

Title: "ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/TRANSVERSE SECTION THROUGH CENTRE OF TURRET"

Date of Subject:

ca. September 28, 1861

Draftsman/Life Dates:

Unknown

Medium:

Ink on tracing cloth

Size [Sheet]:

15 1/4 inches by 24 1/4 inches (est.)

Size [Sight]:

12 1/2 inches by 24 1/4 inches (est.)

Inscribed:

Title Block/Caption:

See title.

Pencil note after title block: "Monitor/Oct. 1861"

Scale: "1/2 inch = 1 Foot"

Rendered: Before September 28, 1861

Original:

Location: National Archives

Identification:

Record Group 45, Office of Naval Records and Library, Subject File 1860-1870, Envelope AD - Design and General Characteristics, U.S. Ships (Including *Monitor*), Box No. 6, Folder 1861-1862, AD *Monitor*, U.S.S., Contract, Specifications, etc., Plans.

Condition: Good

Publication:

Joseph C. Wilson, "Old Plans of Historic Ships," *Transactions of the Society of Naval Architects and Marine Engineers*, Vol. 46, 1939, p. 354, figure 29.

Remarks:

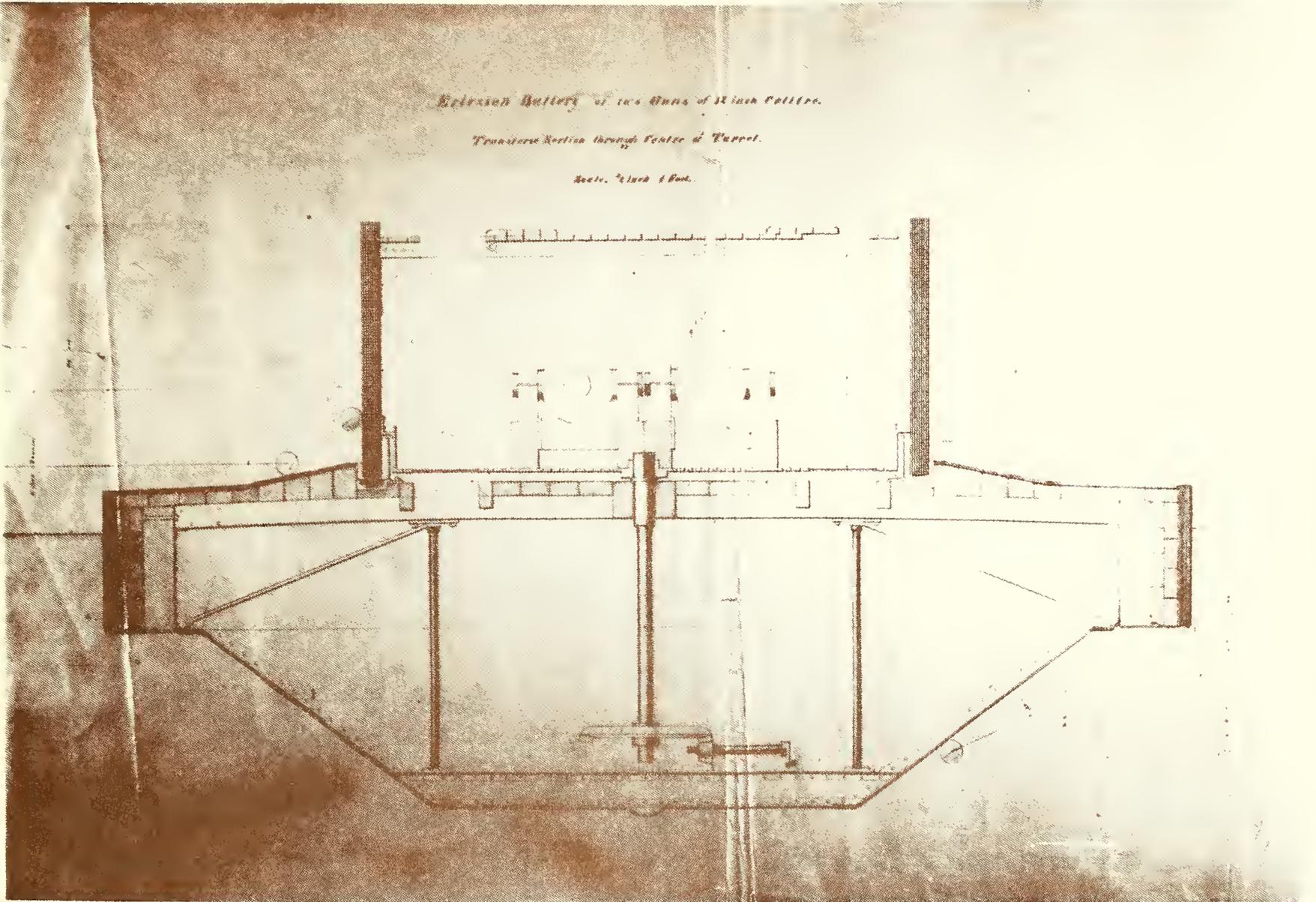
This drawing probably accompanied Catalog Drawing 6. Many of the features of the specifications of September 28, 1861 are shown in this drawing. The smoke trap on the vent of the gun, the roller bearings under the edge of the turret, and the bottom drive of the turret shaft were not adopted in the final version of the *Monitor*. The water trap at the inner edge of the turret and the glacis deck were also dropped in the *Monitor* design. Some of these features bore a resemblance to Capt. Cole's turret design.

A copy of this drawing can be found in the Mariners Museum: #CN-6(2).

Ericsson Battery of two Guns of 12 inch Calibre.

Transverse Section through Centre of Turret.

Scale, 1 inch = 1 foot.



7. "ERICSSON BATTERY OF TWO GUNS OF 12-INCH CALIBRE/TRANSVERSE SECTION THROUGH CENTRE OF TURRET" (National Archives)

GENERAL PLANS AND ARRANGEMENTS

Numbers 8 - 40

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 8

Title: "TOP VIEW AND LONGITUDINAL SECTION OF AN IMPENETRABLE [IMPREGNABLE] FLOATING BATTERY"

Date of Subject:
Early October 1861

Draftsman/Life Dates:
Unknown

Medium: Blueprint

Size [Sheet]:
18 inches by 37 1/2 inches

Size [Sight]:
14 inches by 32 3/8 inches

Inscribed:

Title Block/Caption: See title

Scale: "3/16 inch to the 1 Foot"

Notes:

"Monitor/Oct. 1861". "Length of Upper Vessel, 173 feet/Beam of Upper Vessel, 44 feet 4 inches/Depth of Upper Vessel, 5 feet/Length of Lower Vessel, 124 feet/Beam of Lower Vessel, 34 feet/Depth of Lower Vessel, 5 feet". "C. Gordon/Navy Department/Oct. 1861/Ericsson Letter Oct. 8th/1861".

Rendered: Before October 8, 1861

Original:

Location: National Archives

Identification: RG 19, U.S.S. *Monitor*, Plan No. 26-8-21

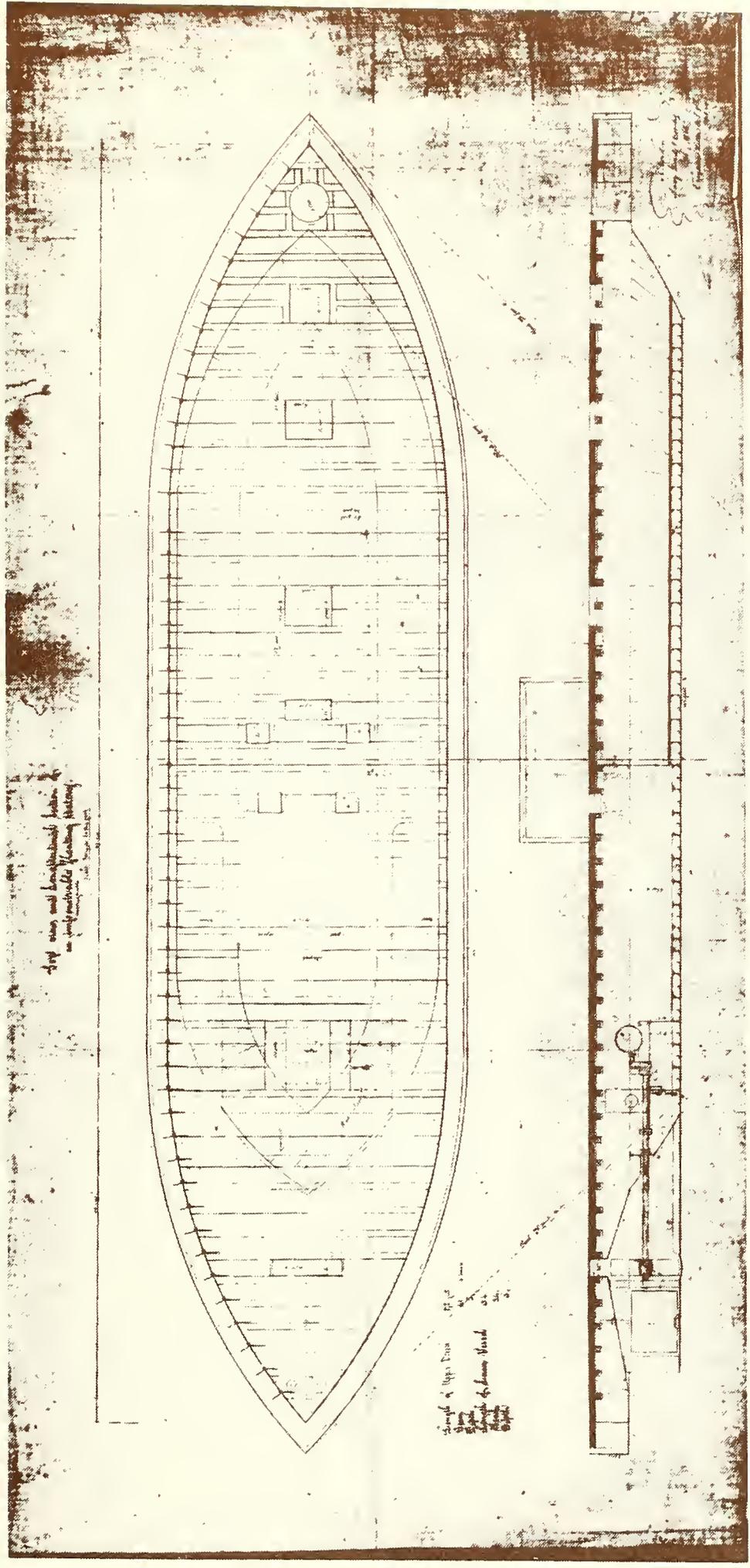
Publication:

Joseph C. Wilson, "Old Plans of Historic Ships," *Transactions of the Society of Naval Architects and Marine Engineers*, 46, 1939, fig. 15.

Edward M. Miller, editor, *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974, pp. 113, 117.

Remarks:

This drawing was an enclosure with a letter from Ericsson to Commodore Smith of October 8, 1861 and represents the first definitive drawing of the *Monitor's* hull. The hatch arrangement in the main deck was not retained. The original dimensions are important for determining the shape of the ends of the hull. The post aft of the rudder was not incorporated in the final design, and the skeg was modified. The two vertical, hollow shafts through the after end of the propellor race are unexplained. The rudder is shown as being of equal dimensions (3 feet) fore and aft of the axle to operate between the propeller post and the rear strut.



8. "TOP VIEW AND LONGITUDINAL SECTION AN IMPENETRABLE [IMPREGNABLE] FLOATING BATTERY" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 9

Title: "ORIGINAL MONITOR"

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium:

Black, blue, red, maroon, and orange ink on tracing cloth.

Size [Sheet]:

18 inches by 35 inches

Size [Sight]:

14 1/4 inches by 32 3/4 inches

Inscribed:

Title Block/Caption: "ORIGINAL MONITOR"

Scale: "3/16 ins. = 1 Foot"

Notes: "Oct. 7th 1861"

Signature/Initials: "J. Ericsson"

Rendered: "7 October 1861"

Original:

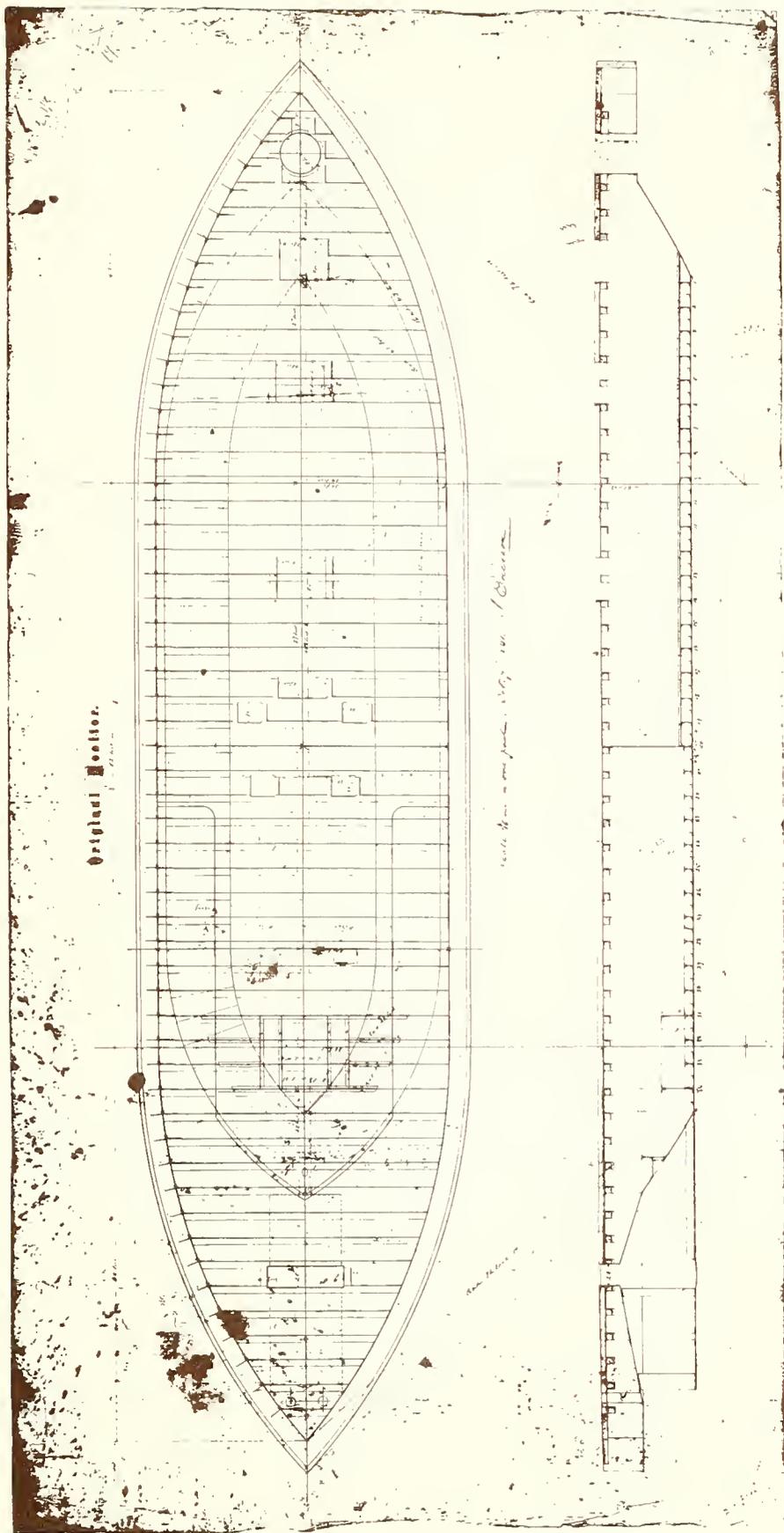
Location: Thomas F. Rowland, Jr. Collection

Condition: Spotted

Remarks:

Although this drawing bears the title "Original Monitor", the text lettering seems out of style with the annotations on the drawing, and they may have been placed on the drawing at a later date. The most important aspect of the drawing is the numbering of the frames, which is found only on this drawing and its copy, Catalog Drawing 10. The frames are numbered from bow to stern beginning with number "1" at the first floor timber. The midship section under the turret and the main bulkhead is number "20." The last frame is number "34" and is located at the last floor timber forward of the bottom of the stern. The interframe stiffeners are not numbered. The lines information and the plating representations are also valuable.

This drawing is similar to the concept of Catalog Drawing 8 as it shows the extra deck hatches not incorporated in the final design as well as the after rudder strut and the unexplained vertical shafts through the overhand at the propellor race.



9. ORIGINAL MONITOR (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 10

Title: "ORIGINAL MONITOR"

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red, and orange ink on tracing cloth.

Size [Sheet]:

17 1/2 inches by 35 1/8 inches

Size [Sight]:

14 1/4 inches by 32 3/4 inches

Inscribed:

Title Block/Caption: "ORIGINAL MONITOR"

Scale: "3/16" = 1 Foot"

Notes: "J. Ericsson"
"Displacement 1057.7 tons"

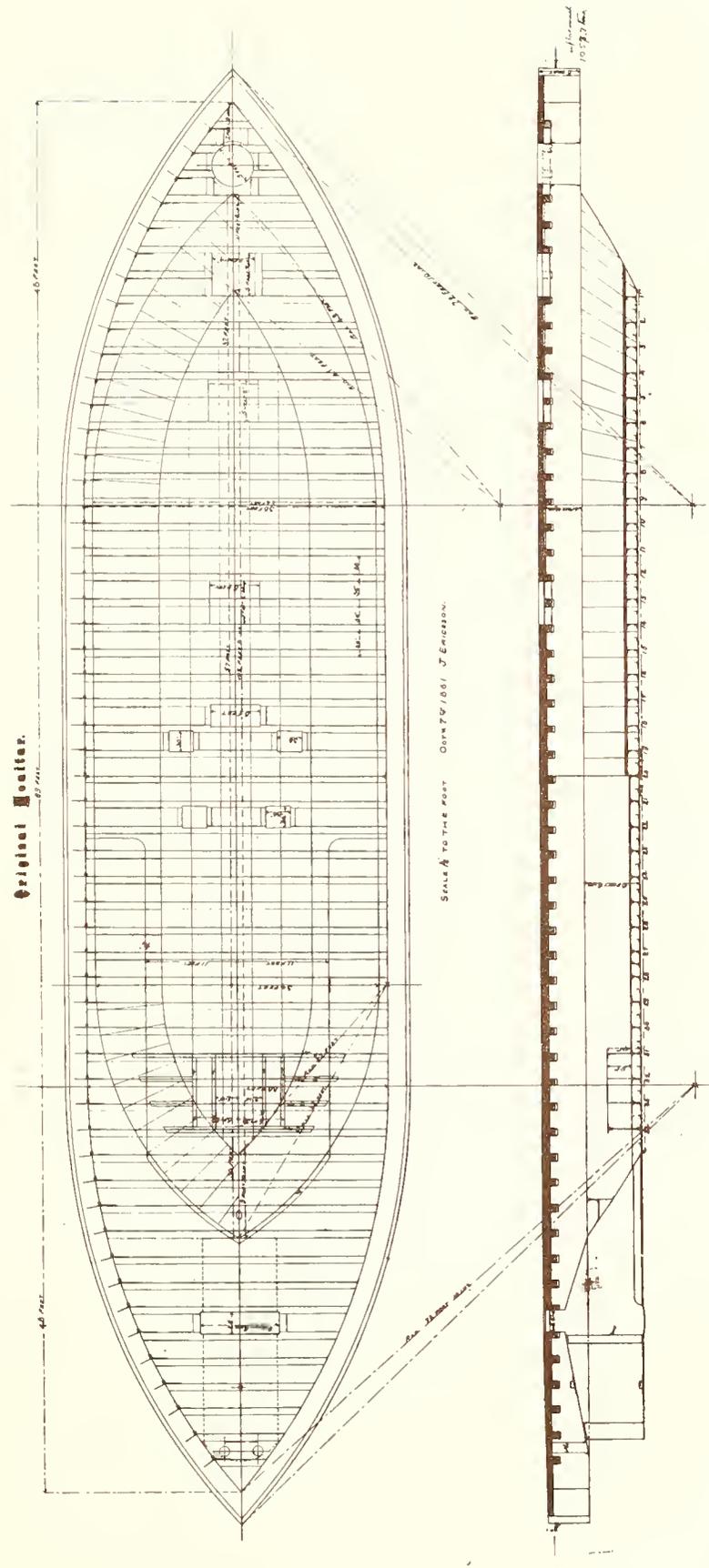
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is essentially a direct copy of Catalog Drawing 9. The lettering is of a different style. When the copy was made is not known, but it has always been in the possession of the Rowland family, operators of the Continental Iron Works and builders of the *Monitor*. The tracing paper seems to have been better preserved than the original.



10. "ORIGINAL MONITOR" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 11

Title: Framing Plan and Inboard Profile

Date of Subject:

Mid-October 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on buff paper.

Size [Sheet]:

18 1/4 inches by 37 1/4 inches

Size [Sight]:

13 inches by 32 3/8 inches

Inscribed:

Scale: 3/16 inch = 1 Foot

Notes:

Dimensions indicating the locations of the deck beam stanchions.

Rendered: Mid-October 1861

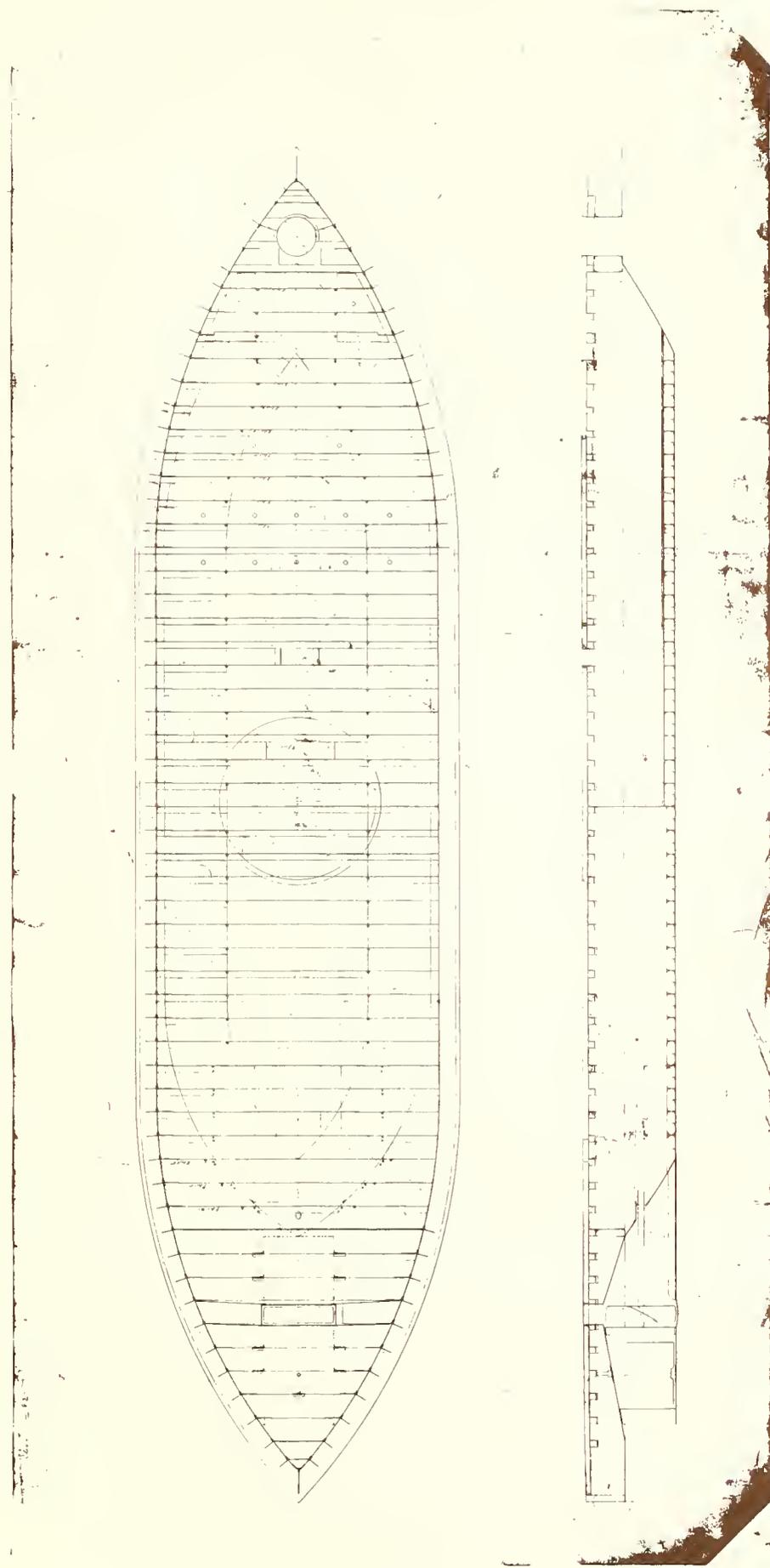
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Dirty with a few cracks at the edges.

Remarks:

This drawing shows the final locations of the deck hatches for the first time, as well as the locations of the deck lights over the wardroom area. Although the two vertical shafts in the stern have been dropped, the rudder strut has not been eliminated. The framing to the forward side of the propeller well appears to be canted, a feature dropped in the final design. The profile of the turret shows very faintly in light blue.



11. Framing Plan and Inboard Profile (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 12

Title: "ERICSSON BATTERY"

Date of Subject:

Mid-October 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

11 1/2 inches by 33 inches

Size [Sight]:

8 7/8 inches by 32 11/16 inches

Inscribed:

Title Block / Caption: "ERICSSON BATTERY"

Scale: 3/16 inch = 1 Foot

Notes:

"aa - water tight bulkhead"

"bb - Ribs, 6 x 3 inches"

"cc - Short, do."

Rendered: Mid-October 1861 (est.)

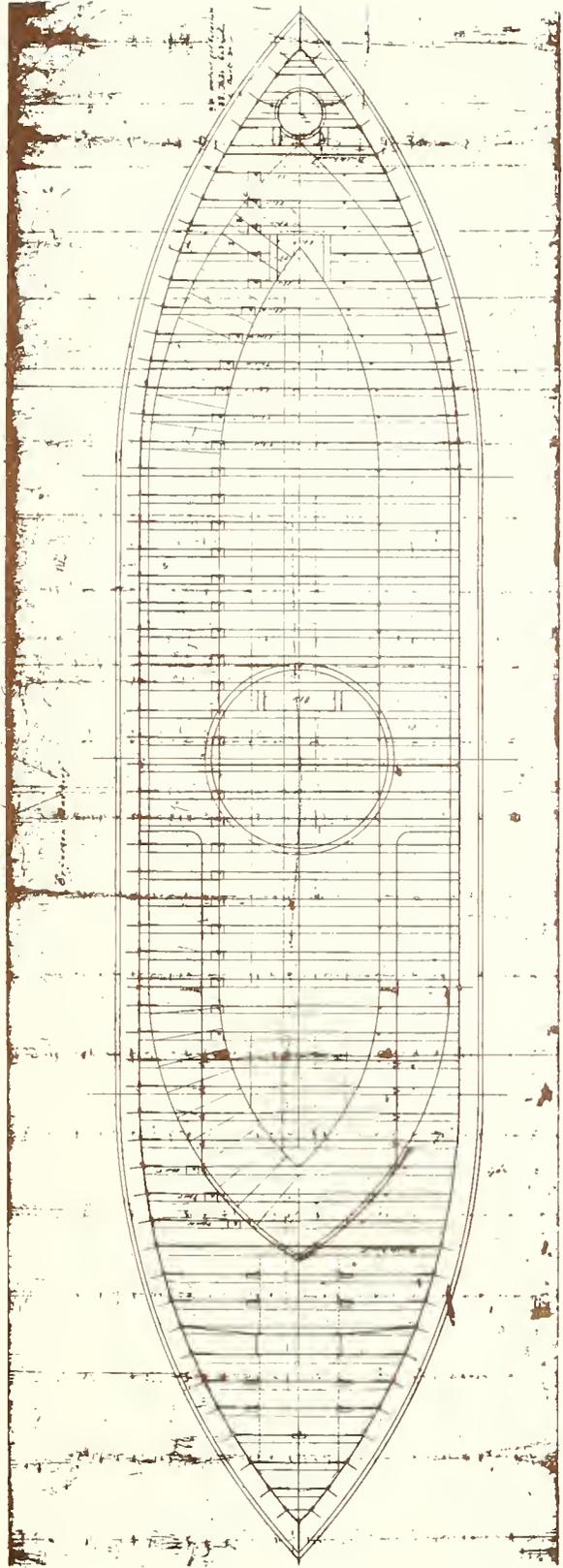
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Stained and dirty

Remarks:

This drawing is a tracing of Catalog Drawing 11 and has always been in the possession of the Rowland family and the Continental Iron Works.



12. "ERICSSON BATTERY" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 13

Title: "AFTER BODY OF MONITOR"

Date of Subject:

Late 1861

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pen and blue and brown ink on manila paper.

Size [Sheet]:

11 7/8 inches by 19 5/8 inches (est.)

Size [Sight]:

10 1/2 inches by 19 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: 3/16 inch = 1 Foot (est.)

Notes:

"After Body of Monitor/Made by C. W. MacCord"

" 'Monitor.'/C. W. MacCord"

Signature/Initials: "C. W. MacCord"

Rendered: October-December 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 14

Condition: Fair. Broken around the edges.

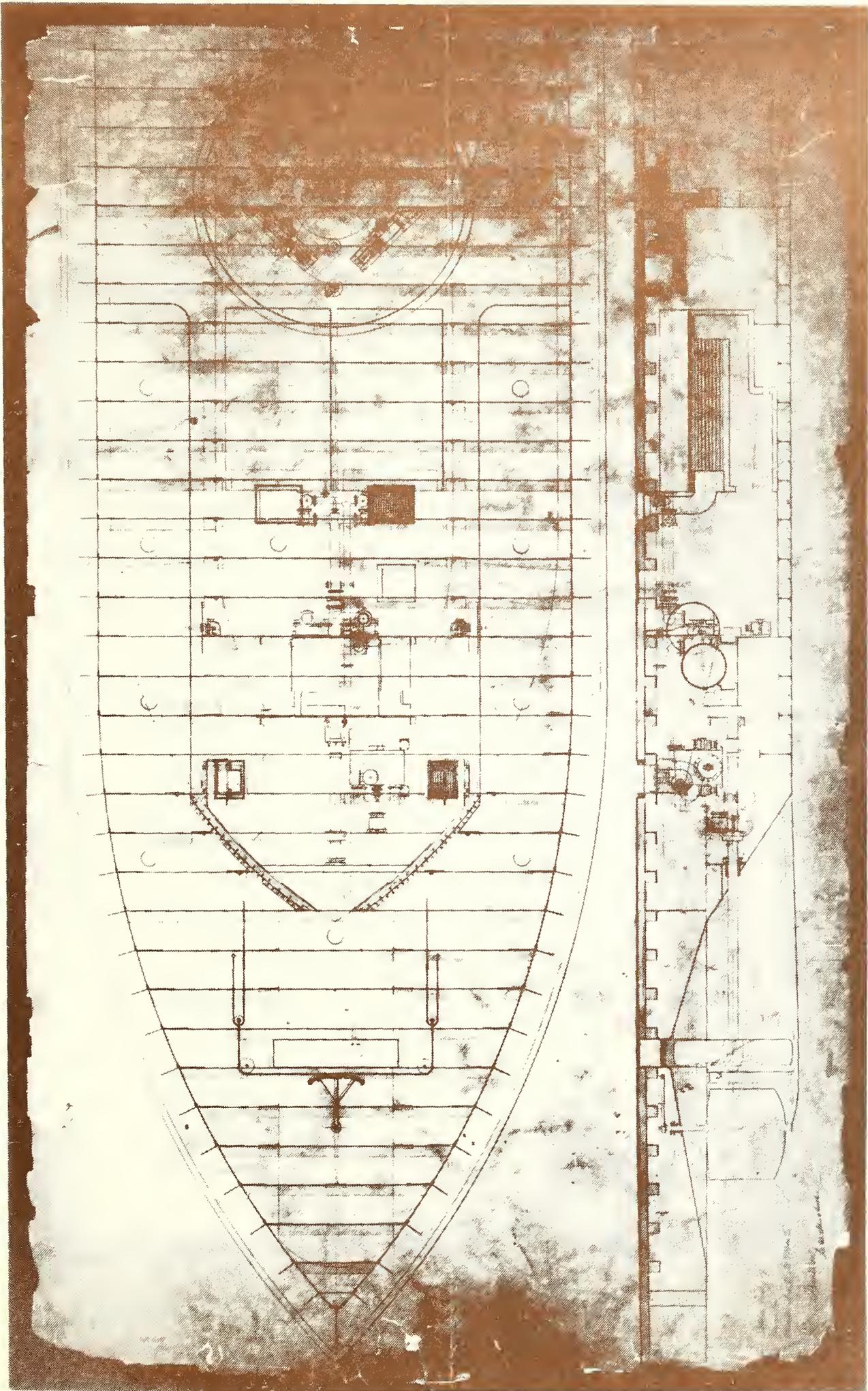
Publication:

F.M. Bennett, "The United States Ironclad, 'Monitor' ", *Cassier's Magazine*, XIII (April 1898), No. 6, p. 466.

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leward Publications, Inc., 1978, p. 29.

Remarks:

This drawing appears to be a rough draft for later drawings made on tracing cloth. Pencil drawings over the turret area indicate some alternate consideration of the location of the center of the turret and a different arrangement of the drive system. The inboard profile shows rare views of the blower engines and blowers that do not appear on later versions of this drawing. The arrangement of the coal scuttles and the rigging of the steering tackle is different from that shown in the final version.



13. "AFTER BODY OF MONITOR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 14

Title: "U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"

Date of Subject:
ca. March 1862

Draftsman/Life Dates:
Unknown

Medium: Black, blue, and brown ink on tracing cloth.

Size [Sheet]:
17 1/2 inches by 47 1/4 inches

Size [Sight]:
12 3/4 inches by 46 inches

Inscribed:

Title Block/Caption: See title.

Scale:

"3/16" = 1 Foot"

[Length on waterline = 32 9/64 inches]

[Length on plan view = 5/16 inches]

Rendered: Estimated ca. March 1862

Original:

Location: American-Swedish Historical Foundation Museum

Identification:

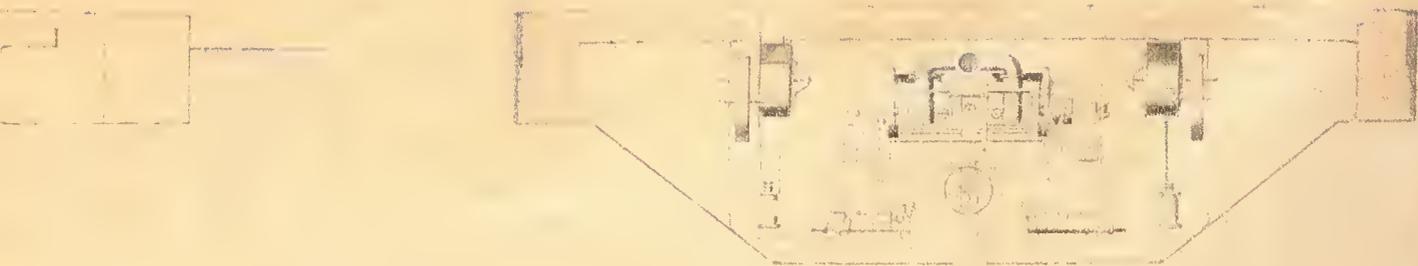
Catalog File No. 623.825, M74U

Original number assigned in 1938: 6000-209

Condition: Excellent, some browning and speckling around edges.

Publication:

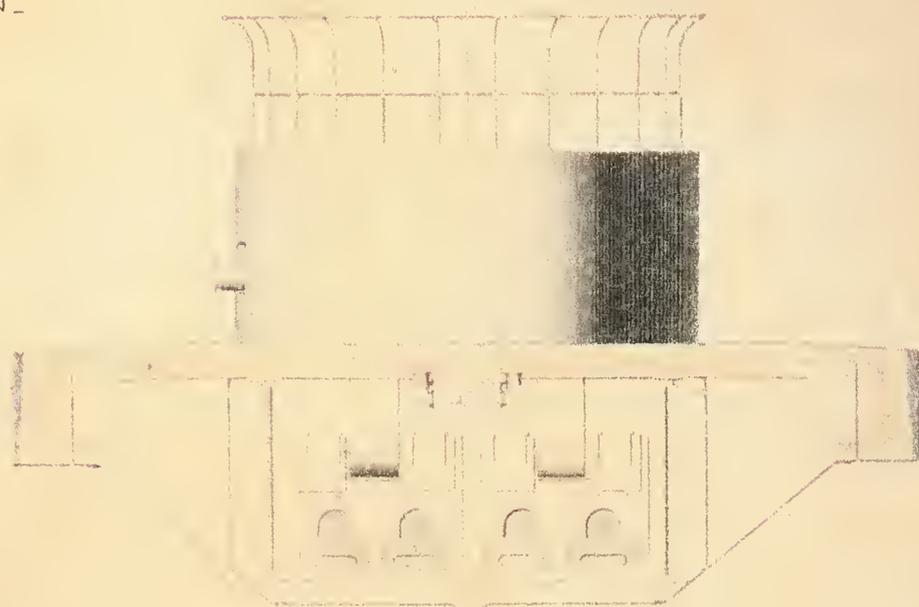
Gordon P. Watts, Jr., *Investigating the Remains of the U.S.S. Monitor*, Raleigh: North Carolina Department of Cultural Resources, 1982.



U.S. Iron Clad Steamer
Monitor.

GENERAL PLAN.

Scale 1/4 in 1 foot.



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 14

Title: "U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"

Date of Subject:
ca. March 1862

Draftsman/Life Dates:
Unknown

Medium: Black, blue, and brown ink on tracing cloth.

Size [Sheet]:
17 1/2 inches by 47 1/4 inches

Size [Sight]:
12 3/4 inches by 46 inches

Inscribed:

Title Block/Caption: See title.

Scale:

"3/16" = 1 Foot"

[Length on waterline = 32 9/64 inches]

[Length on plan view = 5/16 inches]

Rendered: Estimated ca. March 1862

Original:

Location: American-Swedish Historical Foundation Museum

Identification:

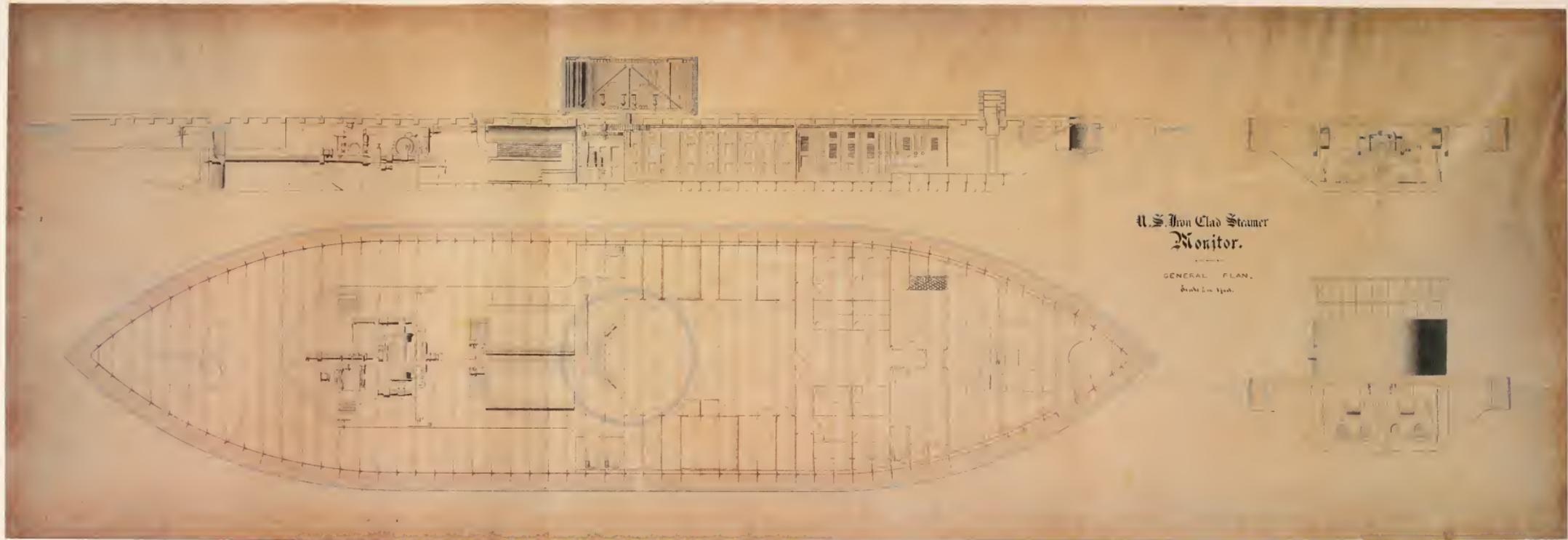
Catalog File No. 623.825, M74U

Original number assigned in 1938: 6000-209

Condition: Excellent, some browning and speckling around edges.

Publication:

Gordon P. Watts, Jr., *Investigating the Remains of the U.S.S. Monitor*, Raleigh: North Carolina Department of Cultural Resources, 1982.



U.S. Iron Clad Steamer
Monitor.

GENERAL PLAN.
June 2nd 1862.

14. "U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"
(American-Swedish Historical Foundation)

Remarks:

This framed drawing of the *Monitor* is hanging in the "Ericsson Model Room" in the American-Swedish Historical Foundation Museum. Four views of the vessel are displayed: Inboard Starboard Profile, Plan of the Lower Deck, Transverse Section of the Hull Looking Aft at the Front of the Main Engine, and a Transverse Section of the Hull Looking Forward of the Boiler Fronts. This drawing may well be one of the most important drawings of the *Monitor* extant. The turret and bulwark armor are colored in blue, the deck beams and wooden bulwarks in brown, and the rest of the ship in black. The dimensions of the rudder are at variance with earlier drawings and the builder's model¹ located in the New-York Historical Society.

An identical copy of this drawing from the Warren E. Hill collection has been deposited in the Mariners Museum.

Footnote:

¹ Gift of Thomas Fitch Rowland, Continental Iron Works, in 1862 to the New-York Historical Society, Accession No. 1862.9.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 15

Title: "U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"

Date of Subject:

ca. January 1862

Draftsman/Life Dates:

Unknown

Medium: Cyanotype Photograph

Size [Sheet]:

7 1/4 inches by 10 1/2 inches

Size [Sight]:

7 1/4 inches by 10 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/16 inch = 1 Foot"

Rendered: January 19, 1892

Original:

Location: Robert Rowland Coykendall Collection

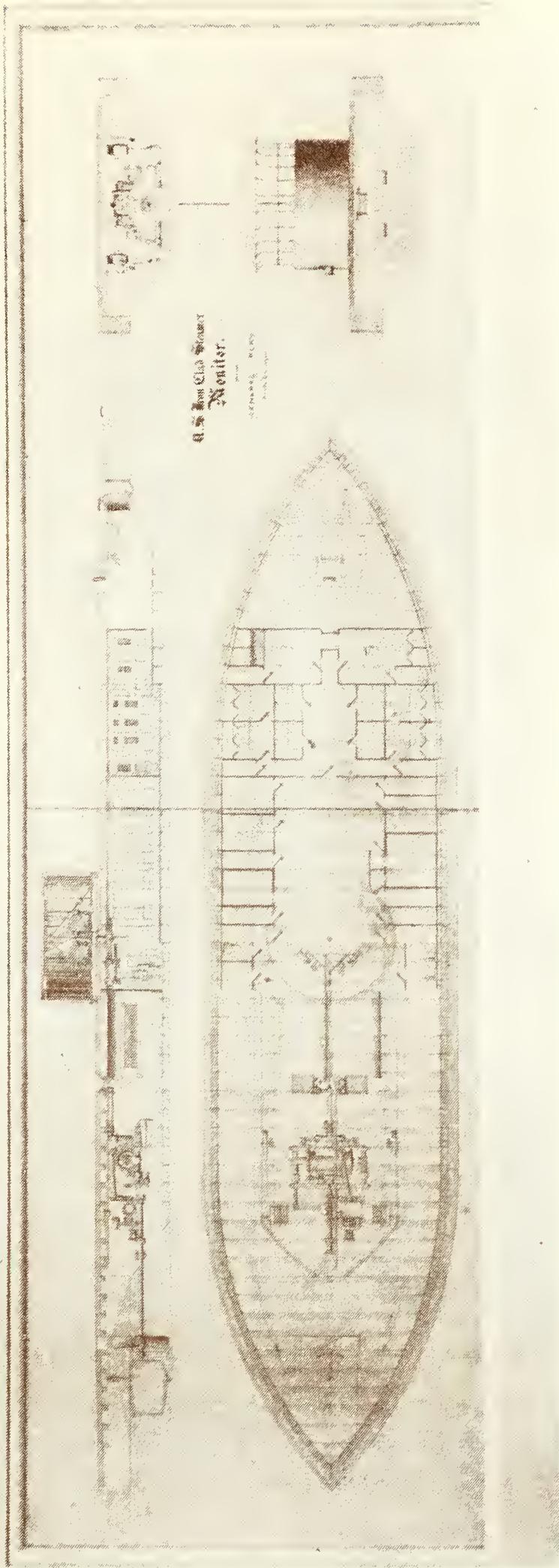
Identification:

Photographic Record of the Continental Iron Works, Vol. 2, September 1889,
Photograph No. 526 of January 19, 1892.

Condition: Good

Remarks:

This photograph shows a framed drawing of the U.S.S. *Monitor*. It is probably the same drawing that hangs in the American-Swedish Foundation's Museum as described under Catalog Drawing 14.



15. "U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN" (Robert Rowland Coykendall Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 16

Title: "CAPT. JOHN ERICSSON'S /U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"

Date of Subject:

January 1862

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red, orange, and yellow ink on tracing cloth.

Size [Sheet]:

15 3/8 inches by 48 inches

Size [Sight]:

12 5/8 inches by 45 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/16 inch = 1 Foot"

Notes:

"Deduced from the original drawings of/Capt. John Ericsson/and from actual measurements/taken from the vessel."

"Constructed at Continental Works/Greenpoint, Brooklyn, N.Y."

"Date of Launch

Jany 30th 1862

Date of Engagement with Merrimac.

March 9th 1862"

Signature/Initials: "Thomas F. Rowland"
"Warren E. Hill Asst."

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition:

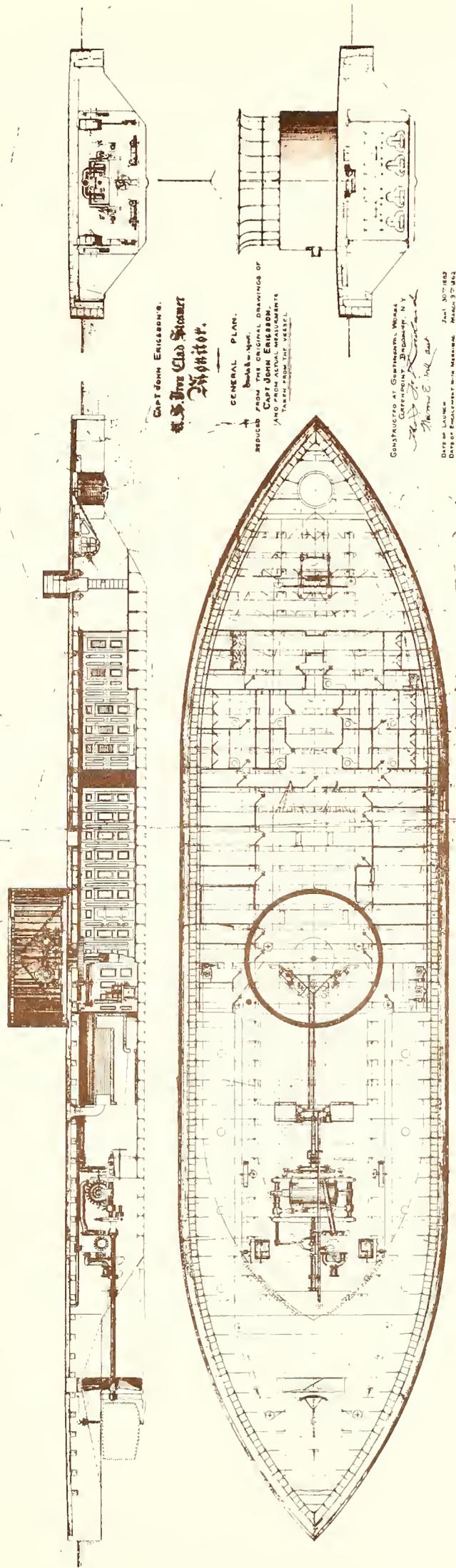
Good, but dirty and previously wrinkled. Drafting pen "start" lines outside border.

Publication:

Gordon P. Watts, Jr., *Investigating the Remains of the U.S.S. Monitor*, Raleigh: North Carolina Department of Cultural Resources, 1982.

Remarks:

This drawing appears to be a tracing of basic information found in Catalog Drawing 14. It may be the product of the Continental Iron Works. A blueprint of this drawing from the Warren E. Hill collection has been deposited in the Mariners Museum.



16. "CAPT. JOHN ERICSSON'S/U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 17

Title: "CAPT. JOHN ERICSSON'S/U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN"

Date of Subject:
ca. January 1862

Draftsman/Life Dates:
Unknown

Medium: Cyanotype photograph

Size [Sheet]:
7 1/4 inches by 10 1/2 inches

Size [Sight]:
7 1/4 inches by 10 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/16 ins. = 1 Foot"

Notes:

"Deduced from the original drawings of/Capt. John Ericsson/and from actual measurements/taken from the vessel."

"Constructed at Continental Works/Greenpoint, Brooklyn, N. Y."

Signature/Initials: "Thos. F. Rowland"
"Warren E. Hill, Asst."

Rendered: See "Remarks"

Original:

Location: Robert Rowland Coykendall Collection

Identification:

Photographic Record of the Continental Iron Works, Vol. 6, January 1898, Photograph No. 1143, dated March 15, 1898.

Condition: Good

Publication:

S.B. Besse, *U.S. Ironclad Monitor*, Museum Publication No. 2, Newport News, Va.: Mariners Museum, 1936, fig. 2.

Richard H. Webber, *Monitors of the U.S. Navy, 1861-1937*, Washington: Government Printing Office, 1969.

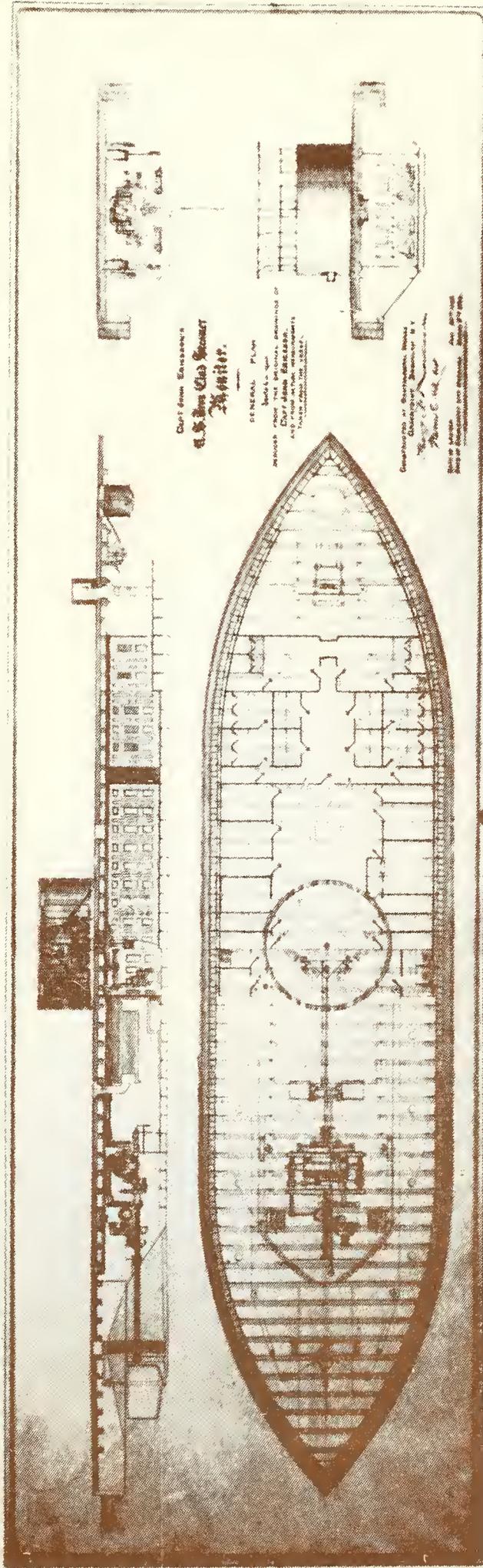
Remarks:

This drawing is probably a photographic copy of Catalog Drawing 16. Warren E. Hill, long-time assistant to Thomas F. Rowland, was a witness to the Ericsson-Rowland contract for the construction of the *Monitor* and at the time the photograph was entered in the photographic record of Continental Iron Works was vice-president of the company.

Black and white copies of photograph can be found in a number of collections:

1. Robert F. Rowland Coykendall Collection — Office Album, Continental Iron Works.
2. Naval Historical Center — Neg. No. NH 50954.
3. The Mariner's Museum — Neg. No. Pn-274.
4. The National Archives — Record Group 77, Index to Fort Plans, Guns & Equipment, A-E; B-Boats-Floating Batteries, Photographs, Continental Iron Works, Mar. 16, 1898, Dr. 159, Sheet 52-1.

Record Group 45, Office of Naval Records, Subject File 1860-70, AD-Design and General Characteristics, Box 6, Folder 1861-1862, *Monitor*, USS, "General Plan."



MAR. 15, 1896 1143

17. "CAPT. JOHN ERICSSON'S/U.S. IRON CLAD STEAMER/MONITOR/GENERAL PLAN" (Robert Rowland Coykendall Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 18

Title: "THE ERICSSON STEEL-CLAD BATTERY, NOW BUILDING AT GREEN POINT, LONG ISLAND"

Date of Subject:

December 1861

Draftsman/Life Dates:

Unknown

Medium: Engraving, newspaper cut.

Size [Sheet]:

16 1/4 inches by 11 1/2 inches

Size [Sight]:

2 inches by 8 1/2 inches

Inscribed:

Title Block/Caption: See title.

Notes: See illustration.

Rendered: Before December 21, 1861

Publication:

"Ericsson Steel-Plated Battery," *Harper's Weekly*, V, (December 21, 1861), p. 806.

Remarks:

Although these sketches contain serious misunderstandings in the general arrangements of the *Monitor*, this is one of the first mechanical drawings of the ship made available to the public. The most obvious error is the position of the guns in the turret, shown as firing in opposition instead of in parallel and in the same direction. The hatches and deck arrangements are all in error except the propeller hatch. The transverse section of the hull is an inaccurate representation of the armor, there being only five, rather than seven, layers of 1-inch plate used in the final version of the ship. The guns were 11-inch caliber, not 12-inch, as stated in the caption.

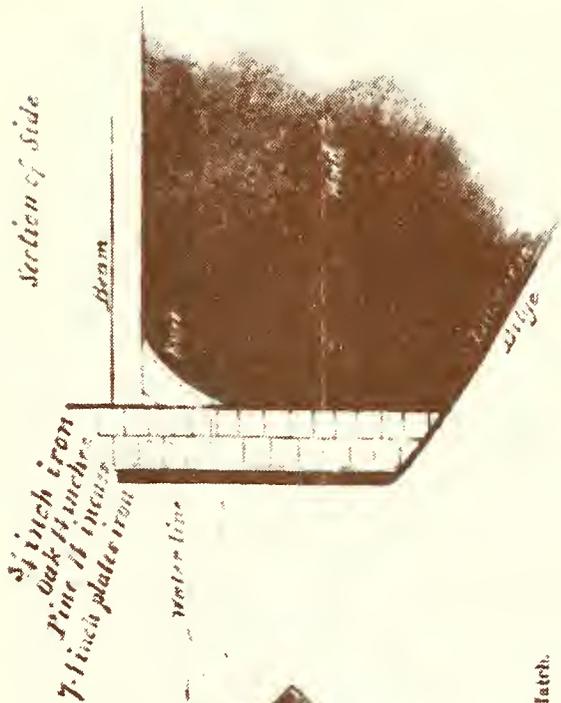
The transverse section carries the expression "linchiron" to designate the sloping sides of the hull.

THE ERICSSON STEEL-CLAD BATTERY, NOW BUILDING AT GREEN POINT, LONG ISLAND.

Deck plan



Section of Side



A, Revolving battery.—B, 12-inch shell guns.—C, Smoke Stack.—D, Propeller Scuttle.—E, Steering Wheel.—F, Hatchways.—G, Forecastle Hatch.

18. "THE ERICSSON STEEL-CLAD BATTERY, NOW BUILDING AT GREEN POINT, LONG ISLAND" (*Harper's Weekly*)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 19

Title: Plan of Paymaster Keeler's Stateroom

Date of Subject:

March 5, 1862

Draftsman/Life Dates:

William Frederick Keeler (1821-1886)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 5/8 inches by 7 3/4 inches

Size [Sight]:

1 1/4 inches by 1 1/4 inches

Inscribed:

Notes:

"A" — [Desk]

"B" — [Door to desk let down to write on]

"C" — [Stateroom Door]

"D" — [Shelves for toilet articles]

"E" — [Berth]

"F.F." — [Closets]

Rendered: March 5, 1862

Original:

Location: U.S. Naval Academy Museum

Identification:

The Letters of Acting Paymaster William Frederick Keeler, U.S. Navy, to his Wife Anna.

Condition: Good

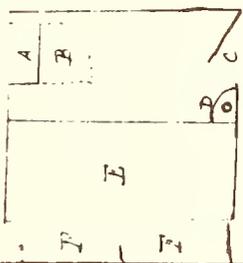
Publication:

William F. Keeler, *Aboard the U.S.S. Monitor, 1862*, edited by Robert W. Daly, Naval Letter Series, No. 1 Annapolis: United States Naval Institute, 1964, p. 25.

Remarks:

The drawing conforms with contemporary drawings of the *Monitor* except that the door is shown as being hinged on the right as the door opens. The drawing indicates a port-side arrangement, but all the outboard portside staterooms on Ericsson's drawings have doors that are hinged on the left. Keeler's cabin is probably located just aft of the captain's cabin.

home once more (as I expected to at the time) when I knew that your letter was due to day. Perhaps you would like to know just how my room looks, I wish you could look into it & see for yourself as you can't for as I have none of "Porte Crayon's" Skill I must therefore use pen & ink - Here is a plan that will give you a little idea - A is my desk, D is the door let down to write on, the iron chest is placed underneath, C is the door, D is the shelf in which is my washbowl, underneath is another



19. Plan of Paymaster Keeler's Stateroom (U.S. Naval Academy Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 20

Title: "NO. 1, UPPER DECK/NO. 2, LOWER DECK"

Date of Subject:

March 7, 1862

Draftsman/Life Dates:

William Frederick Keeler (1821-1886)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 5/8 inches by 7 3/4 inches

Size [Sight]:

4 1/4 inches by 7 1/2 inches

Inscribed:

Title Block/Caption: See title.

Notes:

"Upper Deck"

"A. — Pilot House"

"B.B — Boats lashed to the deck"

"C — Turret"

"D.D. Smoke Stack about Six feet high"

"E.E. — Blower pipes " Four " " "

"F.F. — Guns"

"Lower Deck"

"A — Foot of stairs to deck, covered with flap"

"B — do. " do. " Turret"

"C.C. Doors into engine room through the iron bulkhead represented by the line"

"D — Galley Stove"

"E.E. — Boilers behind which are the engines"

Rendered: March 7, 1862

Original:

Location: U.S. Naval Academy Museum

Identification:

The Letters of Acting Paymaster William Frederick Keeler, U.S. Navy to his Wife, Anna.

Condition: Good

Publication:

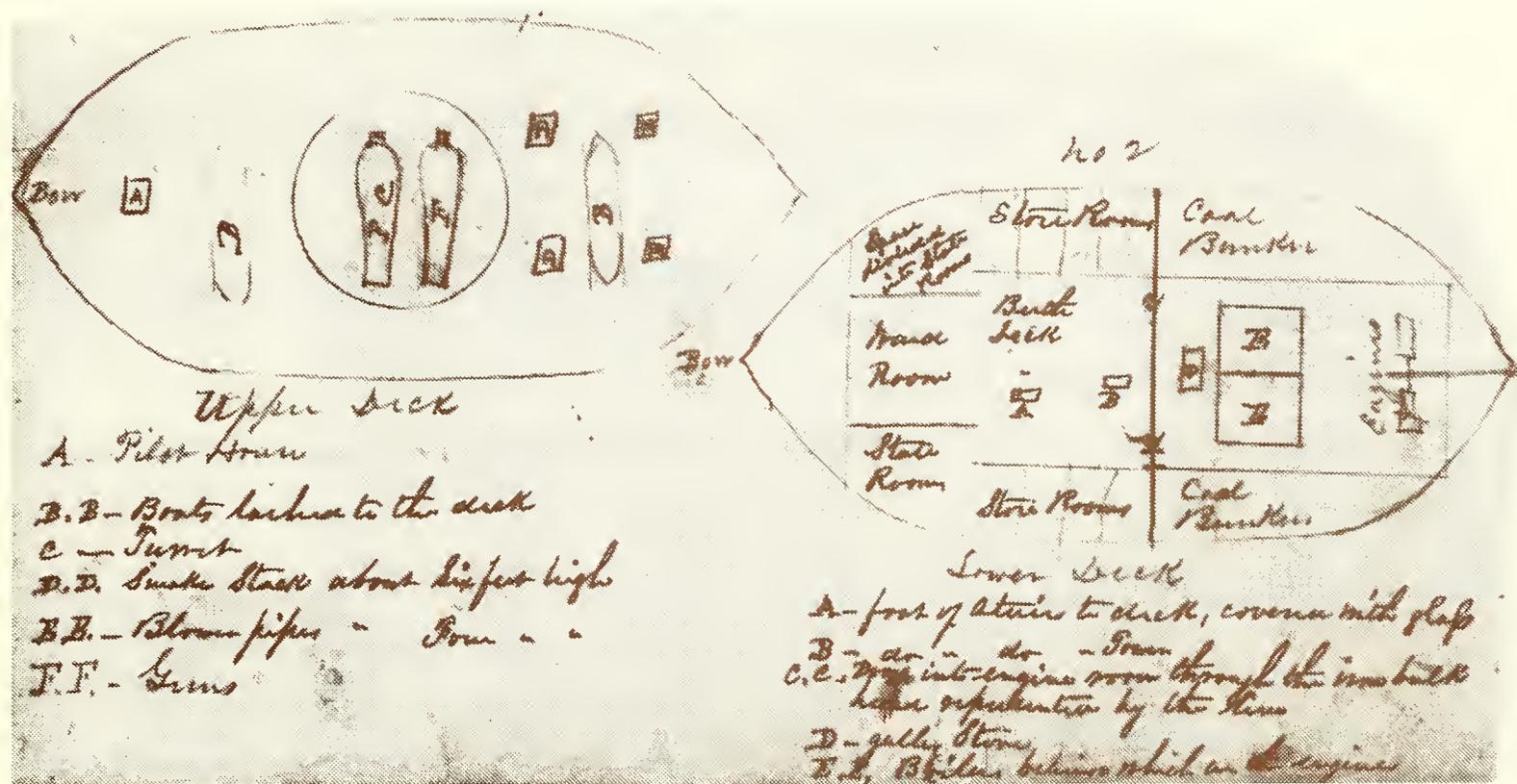
William F. Keeler, *Aboard the U.S.S. Monitor, 1862* edited by Robert W. Daly, Naval Letter Series, No. 1 Annapolis: United States Naval Institute, 1964, p. 29.

Remarks:

These two sketches by Paymaster Keeler make a crude presentation of the upper and lower decks of the *Monitor* just before the battle of March 9, 1862. The drawings confirm the height of the smoke and blower pipes as being 6 feet and 4 feet respectively. The most unique information is the position of the *Monitor's* boats showing one lashed down athwartships between the turret and the berth deck hatch and the other between the blower and smoke pipes — contrary to J. Davidson's drawing "Arrival of the 'Monitor' at Hampton Roads"¹. This means that there must have been deck fittings to secure the lashings.

Footnotes:

¹ S. Dana Green, "In the 'Monitor' Turret," *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New-York: The Century Co., 4 volumes, 1887, p. 719.



20. "NO. 1, UPPER DECK/NO. 2, LOWER DECK" (U.S. Naval Academy Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 21

Title: Deck Plan, Outboard Profile and Transverse Section of the Turret

Date of Subject:

January 30, 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving, newspaper cut.

Size [Sheet]:

16 1/4 inches by 11 1/2 inches

Size [Sight]:

3 3/4 inches by 5 7/8 inches

Inscribed:

Title Block/Caption: "THE 'MONITOR' "

Notes:

See Illustration.

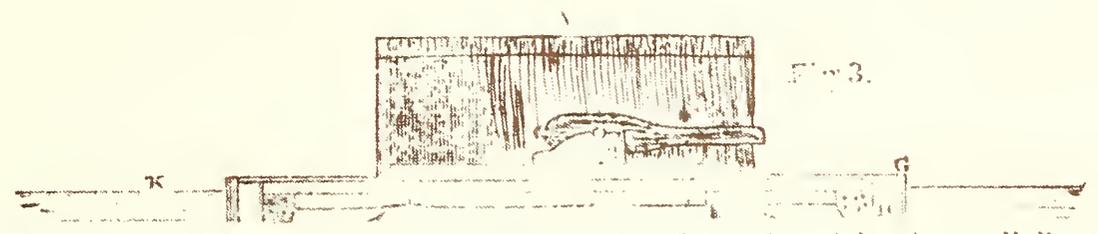
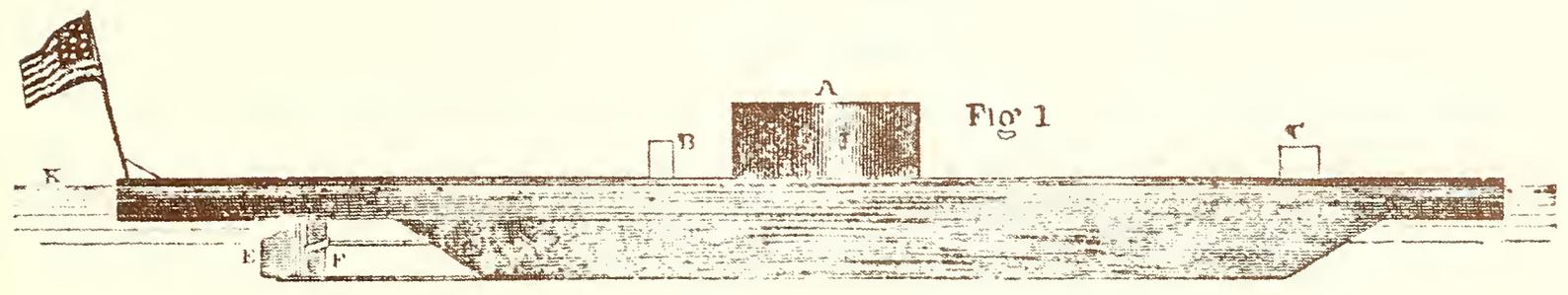
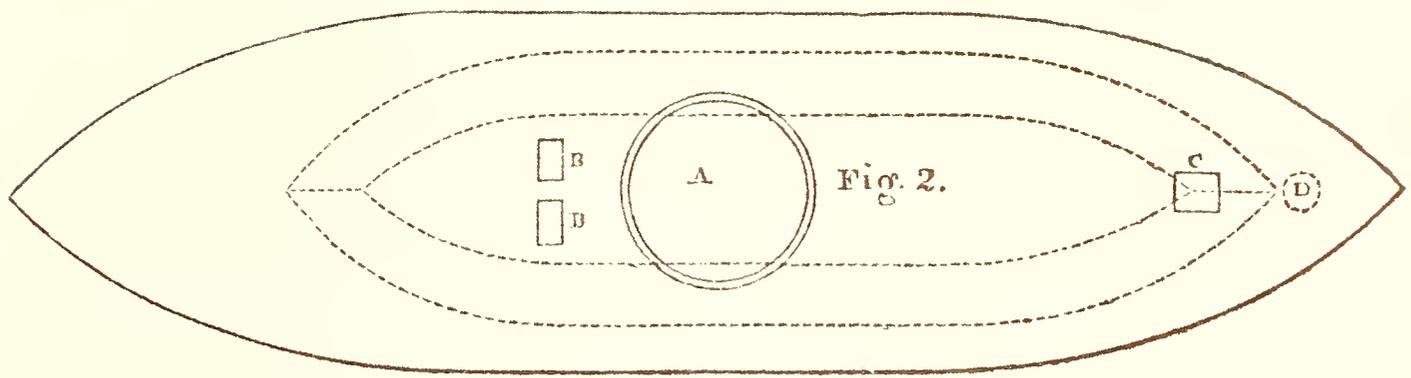
Rendered: Before March 29, 1862

Publication:

"The 'Monitor'," *Harper's Weekly*, VI, (March 29, 1862), p. 203.

Remarks:

Finally, a fairly accurate newspaper representation of the *Monitor* (except for the rake of the mainmast, which was vertical) is shown to the public. The hatches of the blower pipes are not indicated.



A, Revolving Turret.—B, B, Smoke-pipe.—C, Pilot-house.—D, Anchor Well.—E, Rudder.—F, Peppercorn.—G, Iron Armor.—H, Braces for Deck Beams.—
 K, K, Water-line.—L, Dahlgren Gun.—M, Gun-carriage.

21. Deck Plan, Outboard Profile and Transverse Section of the Turret (*Harper's Weekly*)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 22

Title: "DESCRIPTION OF THE MONITOR"

Date of Subject:

March 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving, newspaper cut.

Size [Sheet]:

8 inches by 11 inches

Size [Sight]:

7 5/8 inches by 10 1/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/16 Inch = 1 Foot"

Notes:

See illustration.

Rendered: March 1862 (est.)

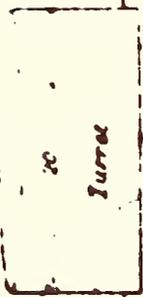
Publication:

Oliver Warner, *Great Sea Battles*, New York: Macmillan Company, 1963, p. 227.

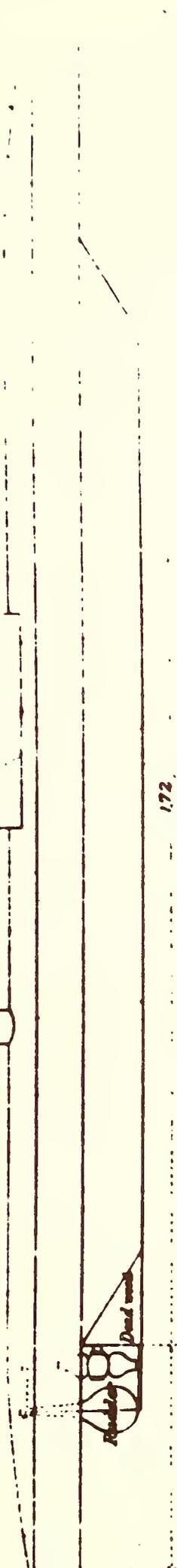
Remarks:

This drawing has been published with a description from the March 11, 1862 issue of the New York Herald, however, examination of the original account reveals an artist's rendition of the *Monitor* rather than this mechanical drawing. This drawing of the *Monitor* retains a few early misconceptions: the round pilothouse and single smokestack. The propeller is misrepresented as having tapering blades. The area under the stern is indicated as "deadwood", when actually there was no structure under the hull at this point. The deck camber in the transverse section is exaggerated and the level of the lower deck as shown corresponds more closely to the engine room flat than to the berth deck. The thickness of the side armor and the dimensions of the ship contained in the accompanying description agree with the launch configuration of the *Monitor*.

ELEVATION

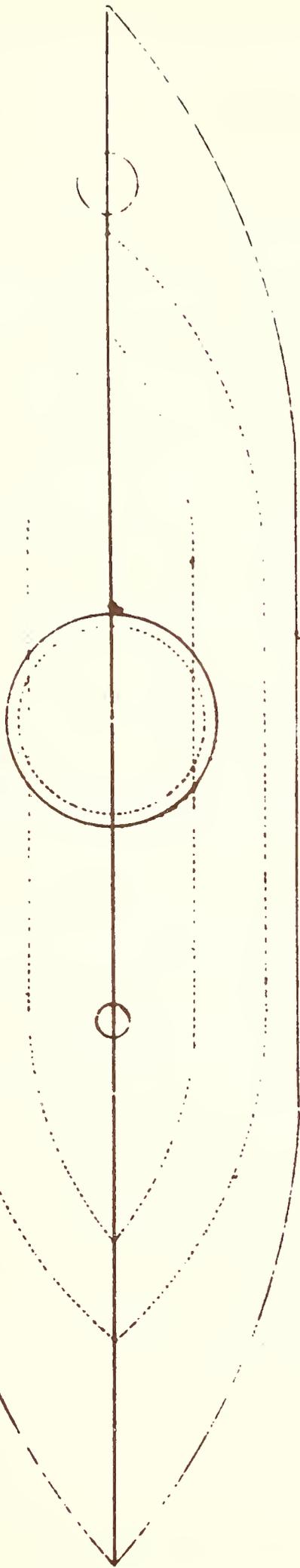


Water House

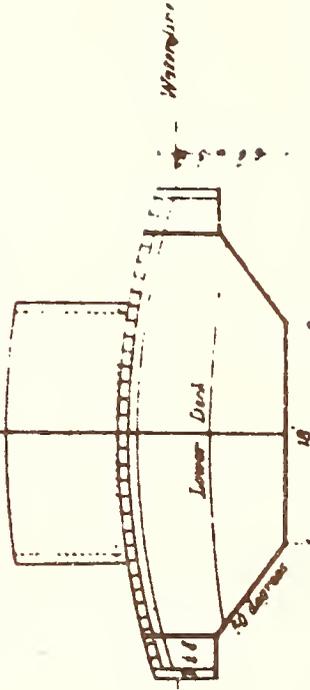


172
126

PLAN



TRANSVERSE SECTION



Scale 1/8" of an Inch to a Foot

DESCRIPTION OF MONITOR

22. "DESCRIPTION OF THE MONITOR" (Macmillan Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 23

Title: "MONITOR (BATTERIE ERICSSON)"

Date of Subject:
March 9, 1862

Draftsman/Life Dates:
Gantie (Dates Unknown)

Medium: Black ink on paper.

Size [Sheet]:
13½ inches by 22 inches

Size [Sight]:
12½ inches by 21½ inches

Inscribed:

Title Block/Caption: See title.

Notes:

Translation of Notes on *Gassendi* Drawing of the *Monitor*

Monitor. (Batterie Ericsson) [Monitor. (Ericsson Battery)]

Monitor [Monitor]

- a. *Observatoire. Poste du Capitaine et du timonier.* [Observatory. Station of the Captain and the helmsman]
- b. *Roue du Gouvernail* [Steering wheel]
- c. *Fente pour voir à l'extérieur* [Slit to see to the outside]
- d. *Guindeau pour virer l'ancre* [Windlass for weighing anchor]
- e. *Logement du Commandant* [Quarters of the Commanding Officer]
- f. *Logements des Officiers* [Quarters of the Officers]
- g. *Poste de l'Equipage* [Station of the Crew]
- h. *Machine à vapeur pour virer la Tour* [Steam engine for turning the Turret]
- k. *Appareil de rotation de la Tour* [Rotation apparatus of the Turret]
- l. *Panneaux et écoutilles* [Hatchcovers and hatchways]
- m.n. *Ligne de flottaison* [Waterline]

- o. *Cheminées* [Smokestacks]
- p. *Chaudières* [Steam boilers]
- q. *Appareil moteur* [Driving engine]
- r. *Tuyau d'échappement des machines auxiliaires pour la ventilation et l'alimentation des chaudières* [Escape pipe of the auxiliary machinery for the ventilation and the feeding of the boilers]
- s. [Engineroom hatchway?]
- t. *Gouvernail* [Rudder]
- u. *Ancre et son enveloppe* [Anchor and its casing]
- x.z. *Massifs ajoutés après le combat du 9 mars* [Masses added after the engagement of 9 March]
[Not shown on drawing]
- v.x. *Cette ligne est égale a 1^m.525* [That line is equal to 1.525 meters (5 feet)]

Virginia. (Merrimac) [Virginia. (Merrimack)]

m.n. *Ligne de flottaison* [Waterline]

a.b. *La toit se termine à la ligne ab; d'après des renseignements altérieurs. La sabords doivent être places plus bas. La plate-forme M est destinée à garantir l'hélice et la Gouvernail.* [The roof ends at the line ab; according to damage reports. The gunports have positions most low. The platform M is designed to protect the propeller and the Rudder.]

Gassendi, Hampton Roads 16 Mars 1862 [Gassendi, Hampton Roads 16 March 1862]

Gantie

C^{te} de Frigate [Commander]

Signature/Initials: "Gantie"

Rendered: March 16, 1862

Original:

Location:

French Archives du Ministère des Affaires Étrangères Collection, Correspondance Politique, Etats-Unis. Vol. 126, p. 294.

Identification:

Report of Capt. Gautier to the Minister of Marine, Hampton Roads, 16 March 1862.

Condition: Good

Remarks:

This drawing was made from information collected by Captain Gautier of the French vessel *Gassendi*, drawn from on-board observations of the *Monitor* after the battle with the C.S.S. *Virginia*. The unique feature of this drawing is the inclusion of an escape pipe just forward of the propeller well, which coincides with the location of the escape steam vent on the deck, as shown in contemporary drawings. The escape pipe itself was never shown on Ericsson's drawings but is present on many of the artistic renditions of the battle.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 24

Title: "UNITED STATES ARMOR GUNBOAT MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Black and white photograph.

Size [Sheet]:

8 inches by 10 inches

Size [Sight]:

3 5/8 inches by 8 1/16 inches

Inscribed:

Title Block/Caption: "FÖRENTA STATERNAS PANSAR KÄNONBÖDT
MONITOR"

Scale: 1/8 inch = 1 foot ["Scalen 1/8 dels tum pa foten"]

Notes:

This drawing bears a Swedish museum stamp in reverse:

"KRIGSARKIVET"

"30/1957"

"Utlandska fartyg

"Kra. N^o 1:1 Box U.2

Sjöh Mus. Arkiv O"

R N:r 4724:2."

Original:

Location: Division of Naval History
Smithsonian Institution

Identification:

Photograph No. 62821

Publication:

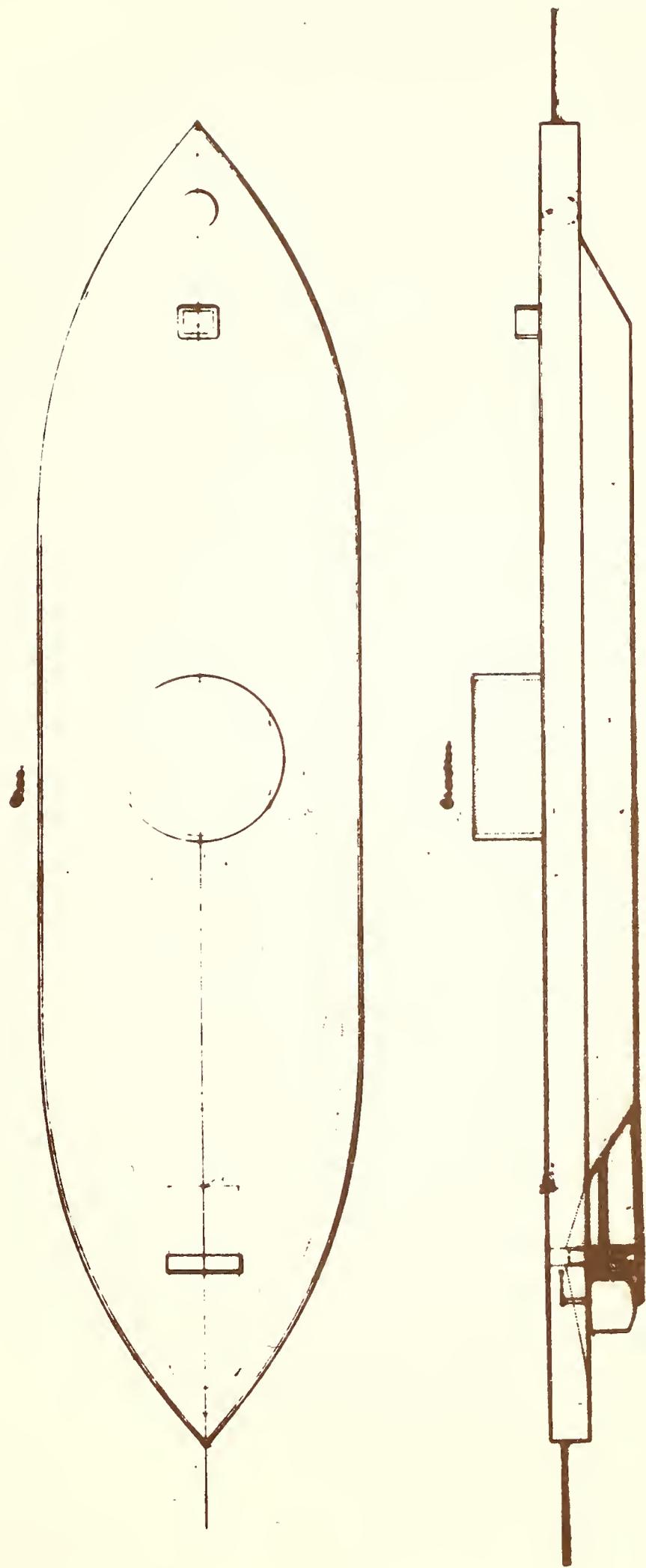
Edward M. Miller, ed. *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes 1974, p. 199.

Remarks:

This drawing is one of four acquired by Dr. Lundeberg of the Smithsonian Institution from the War Museum in Stockholm in the early 1960s.

This simple outboard profile and plan of the ship shows little detail of the deck arrangements. The rudder has the same dimensions as Catalog Drawing 13.

United States Gunboat Monitor
Drawing for the 1862



Wm. H. Rouse
1862

24. "UNITED STATES GUNBOAT MONITOR" (Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 25

Title: "SHIPS OF WAR-IRON ARMOUR/AMERICAN MONITOR CLASS"

Date of Subject:

1862

Draftsman/Life Dates:

Unknown

Medium: Lithograph

Size [Sheet]:

26 1/2 inches by 19 1/4 inches

Size [Sight]:

19 1/2 inches by 18 inches

Inscribed:

Title Block/Caption: See title.

Rendered: ca. 1863

Publication:

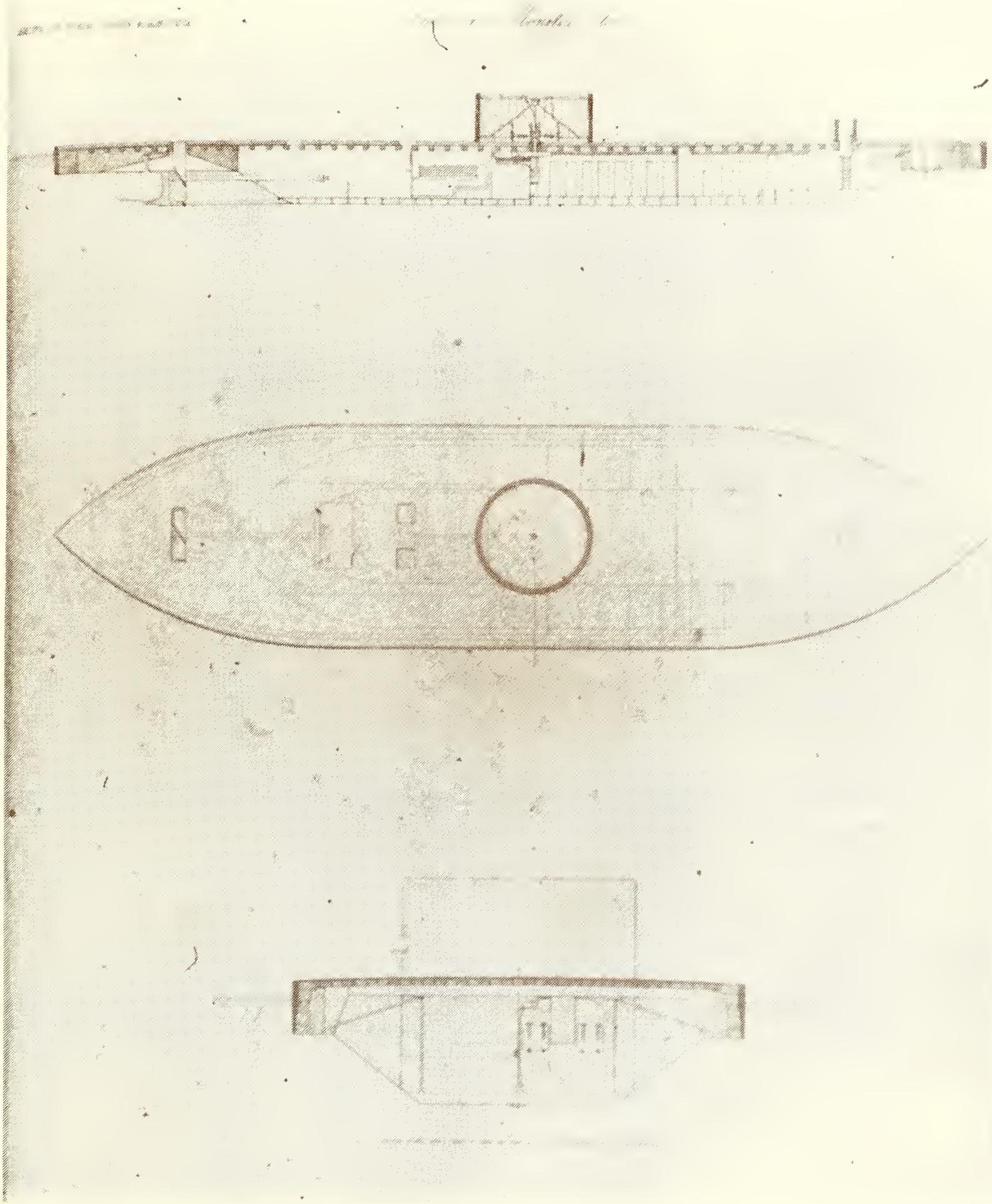
John Scott Russell, *The Modern System of Naval Architecture*, London: Day and Son, 3 volumes, 1864, plate 138.

Alexander C. Brown, "Monitor-Class Warships of the United States Navy", *Historical Transactions 1893-1943*, New York: Society of Naval Architecture and Marine Engineers, 1945, p. 330.

William F. Keeler, *Aboard the USS Monitor, 1862*, edited by Robert W. Daly, Naval Letter Series, Vol. 1, Annapolis: United States Naval Institute, 1964, end paper.

Remarks:

Published as plate 138 in Russell's monumental *The Modern System of Naval Architecture*, this drawing shows a longitudinal section, plan, and cross section of the *Monitor*. This simplified version of the interior omits the main engine and auxiliary machinery. The large rudder is similar to that shown in Catalog Drawing 14.



25. "SHIPS OF WAR-IRON ARMOUR/AMERICAN MONITOR CLASS" (Day and Son)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 26

Title: "THE 'MONITOR' DESIGNED BY JOHN ERICSSON. BUILT AT NEW YORK, 1861"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving, white on black.

Size [Sheet]:

10 3/4 inches by 7 3/4 inches

Size [Sight]:

6 1/2 inches by 4 7/8 inches

Inscribed:

Title Block / Caption: See title.

Notes:

"Side Elevation"

"Deck Plan"

"Transverse Section of Hull and Turret"

"Plate 47. See Chap. XXXII"

Rendered: 1876

Publication:

John Ericsson, *Contributions to the Centennial Exhibition*, New York: "Nation" Press, 1876, plate 47.

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 8.

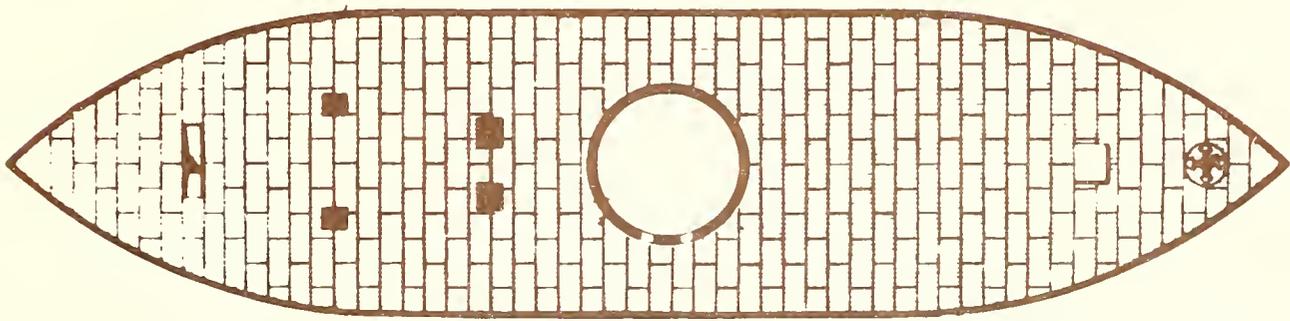
Remarks:

The "Side Elevation" shows the ship in fighting trim without the smoke and blower pipes. The "Deck Plan" shows for the first time the complete plating arrangement of the upper course of the deck armor. The locations for the berth deck and engine room hatches are not shown.

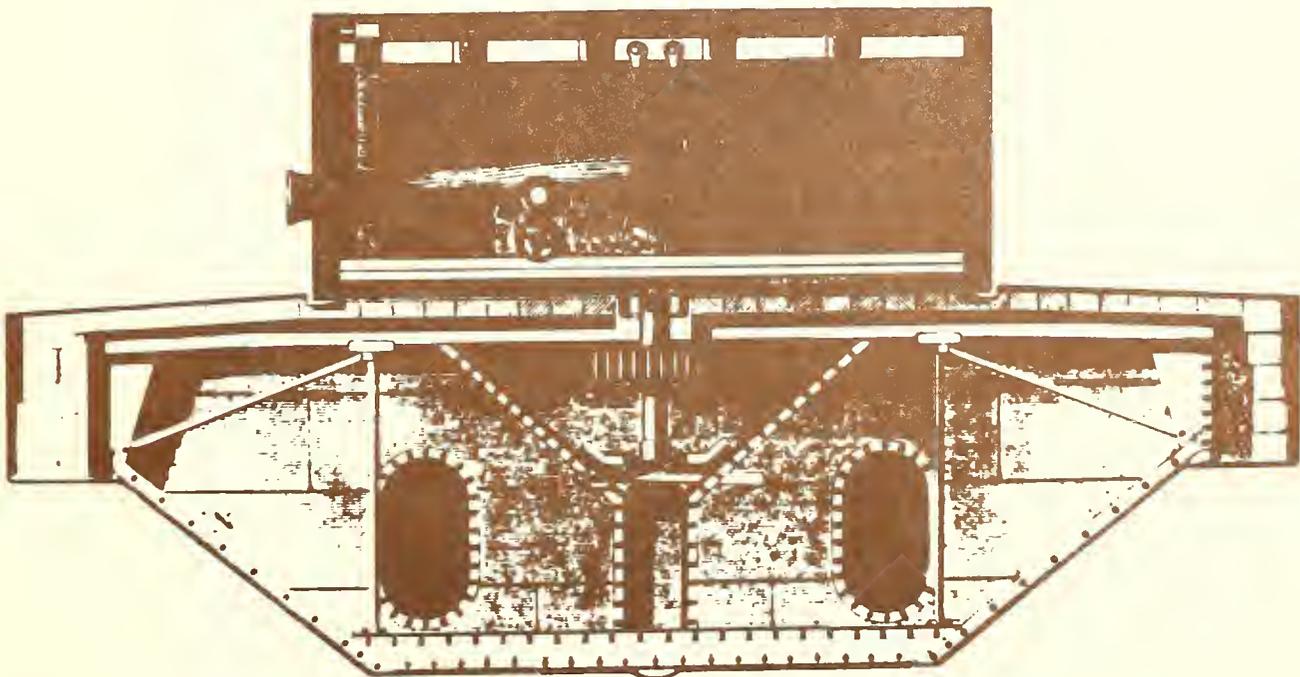
FIG. 10.



DECK PLAN.



TRANSVERSE SECTION OF HULL AND TURRET.



26. "THE 'MONITOR' DESIGNED BY JOHN ERICSSON. BUILT AT NEW YORK, 1861"
("Nation" Press)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 27

Title: "SIDE ELEVATION AND DECK-PLAN OF THE 'MONITOR' "

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

11 inches by 7 1/2 inches

Size [Sight]:

2 1/16 inches by 3 3/16 inches

Inscribed:

Title Block/Caption: See title.

Notes:

"Propeller well/blower-pipes/smoke-stacks/turret/pilot-house"

Rendered: ca. 1888

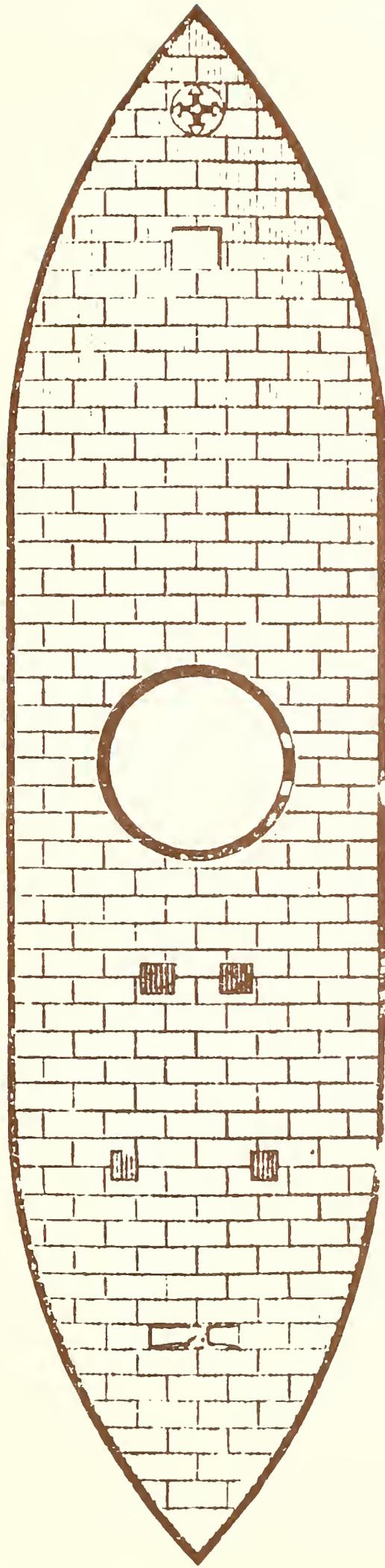
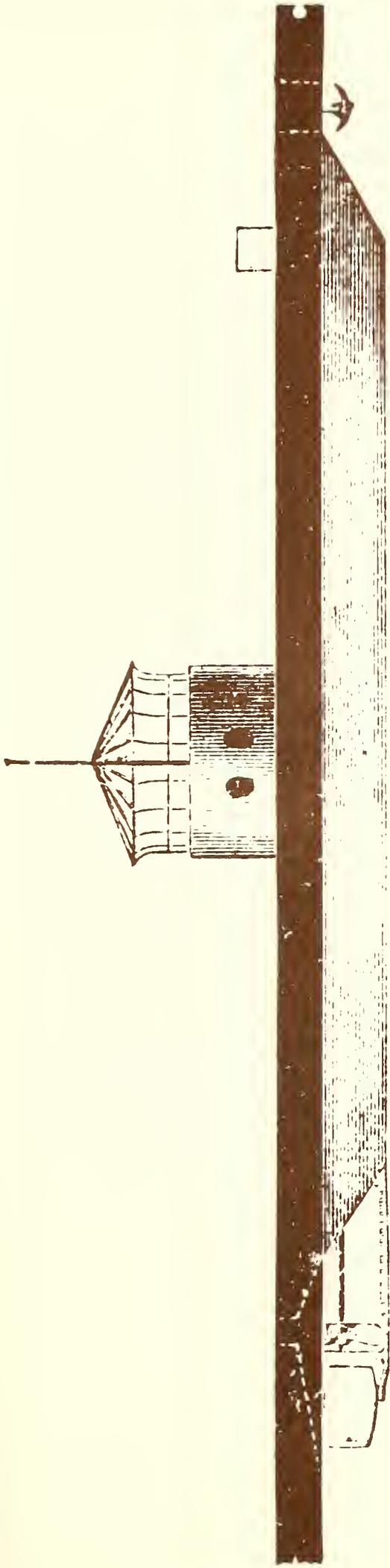
Publication:

S. Dana Greene, "In the Monitor Turret", *Battles and leaders of the Civil War*, by R.U. Johnson and C.C. Buel, eds, Vol. 1, New York: The Century Company, 4 volumes, 1887, p. 722.

William Conant Church, *The Life of John Ericsson*, Vol. 1, New York: Charles Scribners' Sons, 2 volumes, 1907, p. 261.

Remarks:

This cut is evidently a reversal of a portion of the engraving that appears in Catalog Drawing 26 which shows the "Side Elevation and Deck-Plan" only.



PROPELLER WELL. PIPES. SMOKE-STACKS. TURRET. PILOT-HOUSE. ANCHOR-WELL.

SIDE ELEVATION AND DECK-PLAN OF THE "MONITOR."

27. "SIDE ELEVATION AND DECK-PLAN OF THE 'MONITOR' " (The Century Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 28

Title: "THE ORIGINAL ERICSSON MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

9 inches by 5 7/8 inches

Size [Sight]:

1 3/8 inches by 4 1/8 inches

Inscribed:

Title Block/Caption: See title.

Notes:

"a. awning. b. pilot house of iron 'logs.' c. anchor well. d. wooden upper body or raft, armored on sides and deck. e. iron hull or under-body."

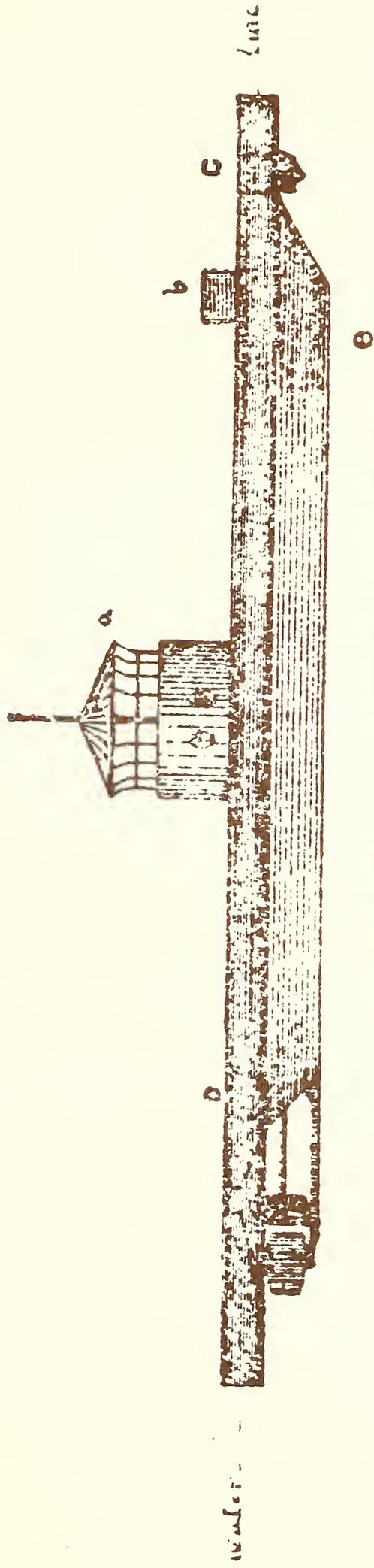
Rendered: ca. 1896

Publication:

Frank M. Bennett, *The Steam Navy of the United States*, Pittsburgh: Warren and Company, 1896, p. 280.

Remarks:

This is another adaptation of Catalog Drawing 27. The caption material describing the "upper body" of the hull does not help in illustrating a clear concept of the *Monitor's* construction. The wooden components of the *Monitor* were the deck beams, the deck planking, and the backing of the side armor. The rest of the hull and deck armor was wrought iron.



THE ORIGINAL ERICSSON MONITOR.

28. "THE ORIGINAL ERICSSON MONITOR" (Warren and Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 29

Title: "LONGITUDINAL PLAN THROUGH THE CENTER LINE OF THE ORIGINAL MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 inches by 7 1/2 inches

Size [Sight]:

- (1) 1 inch by 5 1/8 inches
- (2) 1 11/16 inches by 4 5/16 inches
- (3) 1 1/4 inches by 4 7/8 inches

Inscribed:

Title Block/Caption: "1. Aft Section. Longitudinal Plan Through the Center Line of the Original Monitor."
"2. Central Section, Same Plan."
"3. Forward Section, Same Plan."

Rendered: ca. 1885 (est.)

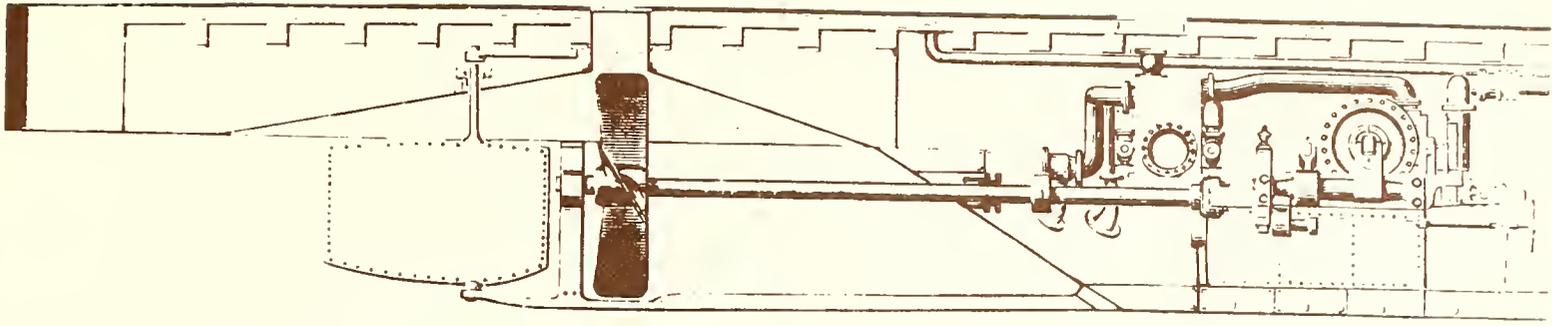
Publication:

John Ericsson, "The Monitors," *The Century Illustrated Monthly Magazine*, XXXI., New Series Vol. IX. (November 1885 - April 1886), pp. 282-283.

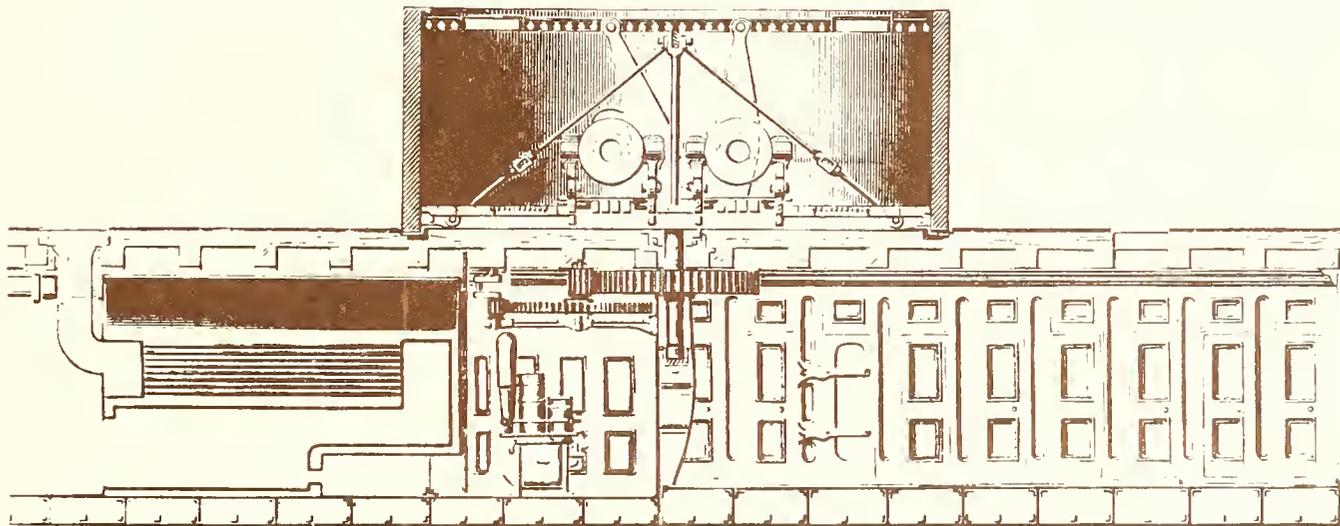
John Ericsson, "The Building of the Monitor," *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New York: The Century Company, 4 volumes, 1887, pp. 732-733.

Remarks:

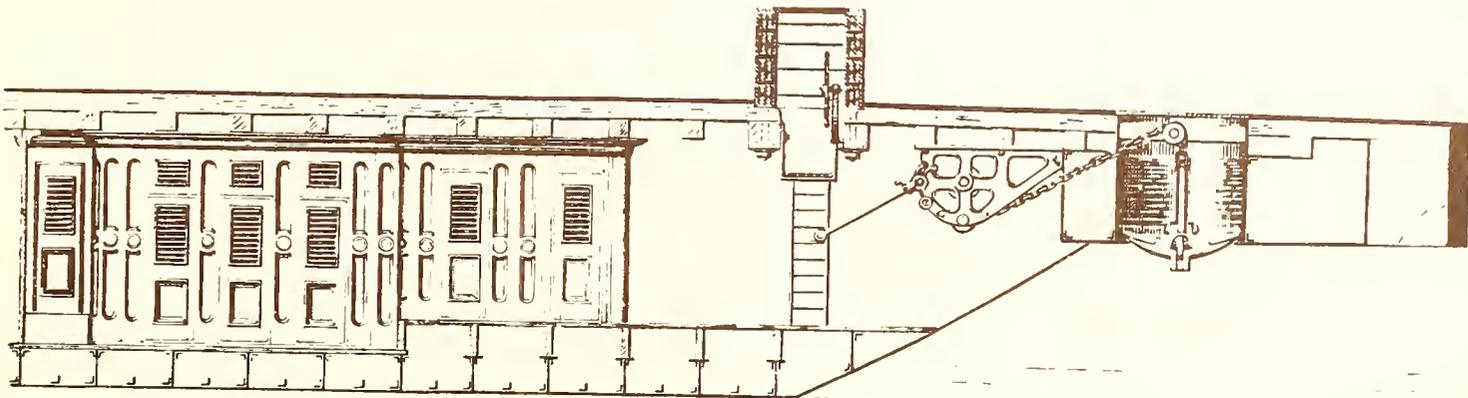
This detailed engraving compares with the accuracy of Catalog Drawing 14. One frame has been dropped off at the forward end of Part (1) of the set, so the drawings must be reassembled taking this missing part into account. The two other sections are complete and show a very slight overlap. The condenser discharge pipe valve and the sea injection valve connections with the hull on the inboard profile are indicated as being on the port side, probably as a drafting convenience, in contradiction with plan views of the engine room, i.e., Catalog Drawing 13, which shows them attached to the starboard side.



1. AFT SECTION. LONGITUDINAL PLAN THROUGH THE CENTER LINE OF THE ORIGINAL MONITOR.



2. CENTRAL SECTION, SAME PLAN.



3. FORWARD SECTION, SAME PLAN.

29. "LONGITUDINAL PLAN THROUGH THE CENTER LINE OF THE ORIGINAL MONITOR" (The Century Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 30

Title: Longitudinal Sections of the *Monitor*

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

11 7/8 inches by 9 1/4 inches

Size [Sight]:

2 3/4 inches by 5 inches

Inscribed:

Title Block/Caption: "Longitudinal Section Aft"

Notes:

Stamped "NARS" in blue.

Rendered: ca. 1885 (est.)

Original:

Location: U.S. National Archives

Identification:

Record Group 45, Office of Naval Records and Library Subject File 1860-70, AD-Design and General Characteristics, U.S. Ships (Including *Monitor*), Box 6, Folder 1861-1862, AD *Monitor*, USS, Contracts Specifications, etc., Plans.

Condition: Good

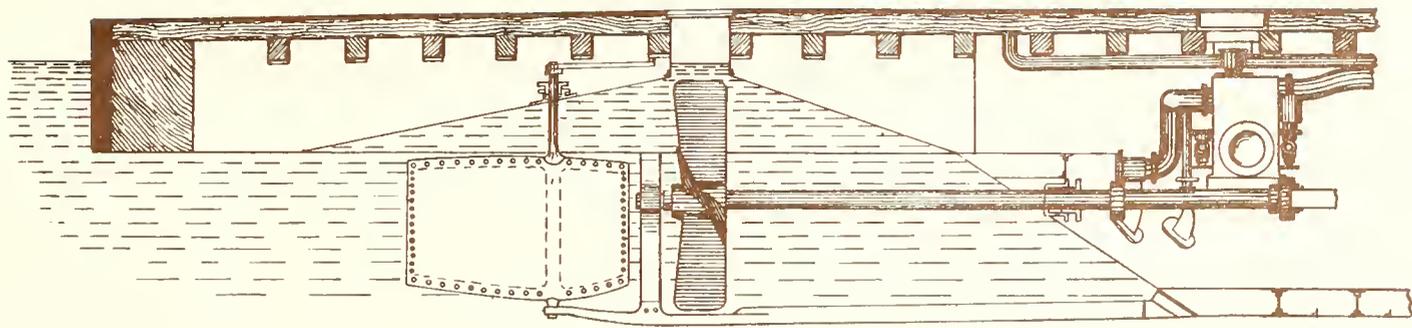
Publication:

Official Record of the Union and Confederate Navies in the War of the Rebellion, Washington: Series 1, Vol. 7, 1894-1922, p. 24a.

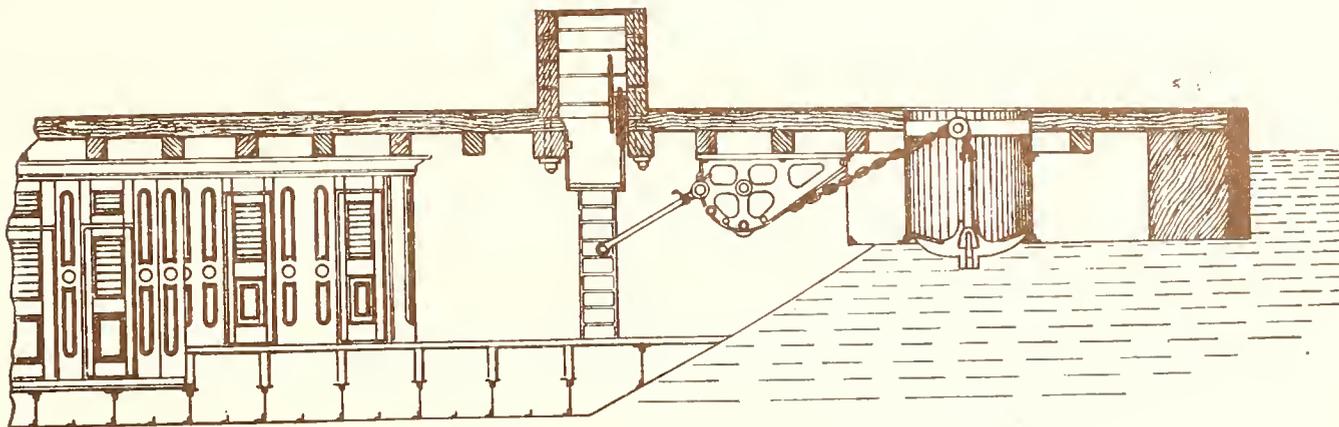
Edward M. Miller, editor, *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

Remarks:

These sections are almost identical to those of Catalog Drawing 29. The exceptions are some simplifications of lines and differences in shading. The center section is missing.



LONGITUDINAL SECTION AFT.



LONGITUDINAL ELEVATION SHOWING SECTION FORWARD OF ORIGINAL MONITOR.

30. Longitudinal Sections of *Monitor* (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 31

Title: "PLAN OF THE BERTH DECK OF THE ORIGINAL MONITOR, DRAWN TO SCALE"

Date of Subject:

ca. January 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 inches by 7 1/2 inches

Size [Sight]:

2 inches by 3 3/4 inches

Inscribed:

Title Block/Caption: See title.

Notes:

"a, captain's cabin; b, his state-room; c, state rooms of the officers; w, wardroom; d, quarters of the crew, with store-rooms on the sides."

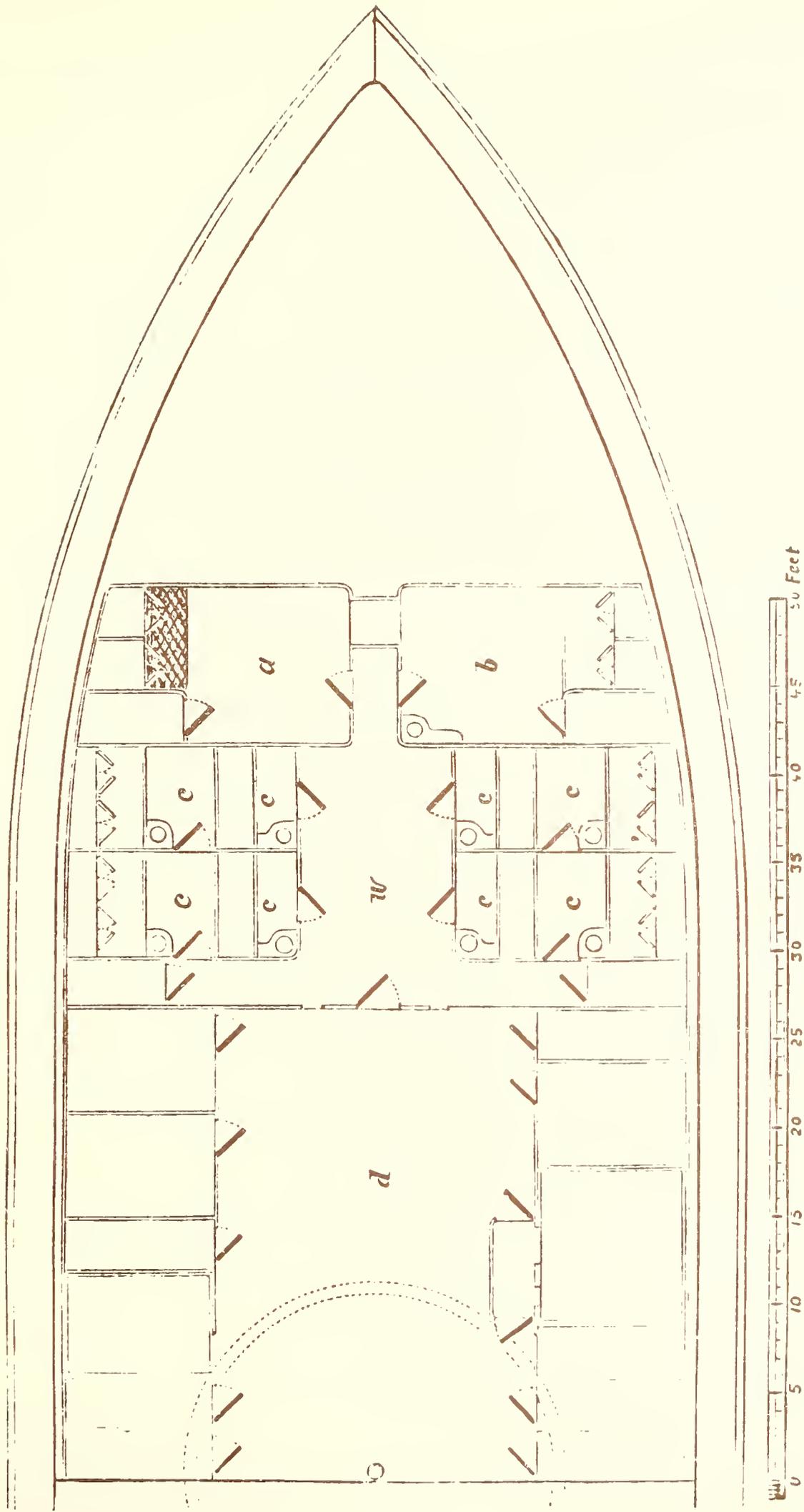
Publication:

John Ericsson, "The Monitors," *The Century Illustrated Monthly Magazine*, Vol. XXXI, New Series Vol. IX, (November 1885 - April 1886), p. 286.

John Ericsson, "The Building of the 'Monitor'," *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New York: The Century Company, 4 volumes, 1887, p. 735.

Remarks:

The engravings were prepared from drawings lent by Captain Ericsson. The plan view shows the layout of the compartments of the berth deck, the wardroom, and the captain's quarters.



PLAN OF THE BERTH-DECK OF THE ORIGINAL MONITOR. DRAWN TO SCALE.

31. "PLAN OF THE BERTH DECK OF THE ORIGINAL MONITOR, DRAWN TO SCALE"
 (The Century Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 32

Title: Testimonial *Monitor* Coliage to Thomas Fitch Rowland

Date of Subject:

1861-1907

Draftsman/Life Dates:

Charles H. Corbett (Dates Unknown)

Medium: Pen and ink, watercolor, and photographs.

Size [Sheet]:

19 1/4 inches by 29 5/8 inches

Size [Sight]:

17 1/2 inches by 27 3/4 inches

Inscribed:

Title Block/Caption: "DEDICATED TO THE MEMORY OF THOMAS FITCH ROWLAND, BUILDER OF THE ORIGINAL MONITOR/ 1859-PROPRIETOR OF THE CONTINENTAL IRON WORKS, BROOKLYN, N. Y. FOR 48 YEARS-1907."

Notes:

See illustration.

Signature/Initials: "C.H. Corbett, Del., June 1908"

Rendered: June 1908

Original:

Location: New York Historical Society Museum Print Collection

Identification:

Negative No. 21474

Remarks:

According to Miss Mary Esther Rowland¹, daughter of Charles B. Rowland, a vice-president of the Continental Iron Works and son of Thomas Fitch Rowland, this collage was prepared on the instruction of her father to honor the memory of Thomas F. Rowland after his death in 1907. The material was assembled by Mr. Charles H. Corbett, a vice-president of the Continental Iron Works, from drawings taken from publications and various photographs. All of the battle scenes and the map are from *Battles and Leaders of the Civil War*, Vol. 1. The portraits are photographs or engravings of famous personages associated with the building and fighting concerned with the *Monitor* and *Virginia*. A legend containing historical facts regarding the two ships appears on right-hand side of the sheet. Some of the dates and facts concerning the dimensions of the *Monitor* disagree with the historical record.

The drawings of the *Monitor* contained in the collage show the inboard details of a longitudinal section, deck fittings, and masts. Deck fittings of this type do not appear in the photographs or in contemporary plans. The plan view splits the hull, showing the details of the living and machinery spaces on the upper half and the deck plating on the lower half. The deck plating shows the long axes of the plates running fore and aft instead of athwartships according to contemporary drawings and photographs of the decking. It is curious that a 21 1/2-inch wooden model of the *Monitor* in the Robert Rowland Coykendall collection and owned by Charles H. Corbett in 1904 has the deck plates laid out in the same manner.

The *Monitor* portion of this collage shows three transverse section views. The first is a section just forward of the main engine looking aft, showing the blower pipes. The second is a view of the stern with a section through the center of the turret and the guns trained to port. The third is a section just aft of the boiler fronts, showing the smoke stacks and the turret trained forward.

Copies of this collage are located in the Thomas Fitch Rowland Collection and the Mariner's Museum Library (Neg. No. PN-196 and the Warren E. Hill Collection.)

Footnotes:

¹ Telephone conversation E.W. Peterkin to Miss Mary Ester Rowland, February 10, 1979.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 33

Title: "PLANS OF/U.S.S. MONITOR"

Date of Subject:
ca. February 1862

Draftsman/Life Dates:
Unknown

Medium: Ink on tracing cloth.

Size [Sheet]:
15 1/4 inches by 33 3/4 inches

Size [Sight]:
10 1/2 inches by 29 1/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/8 inch"

Notes:

"Sheer Plan"

"Length 174 ft."

"Beam 44 ft."

"Demountable tops to hatches" [Referring to the blower and smoke pipes]

"Demountable top" [Referring to the pilot house]

Original:

Location: National Archives

Identification:

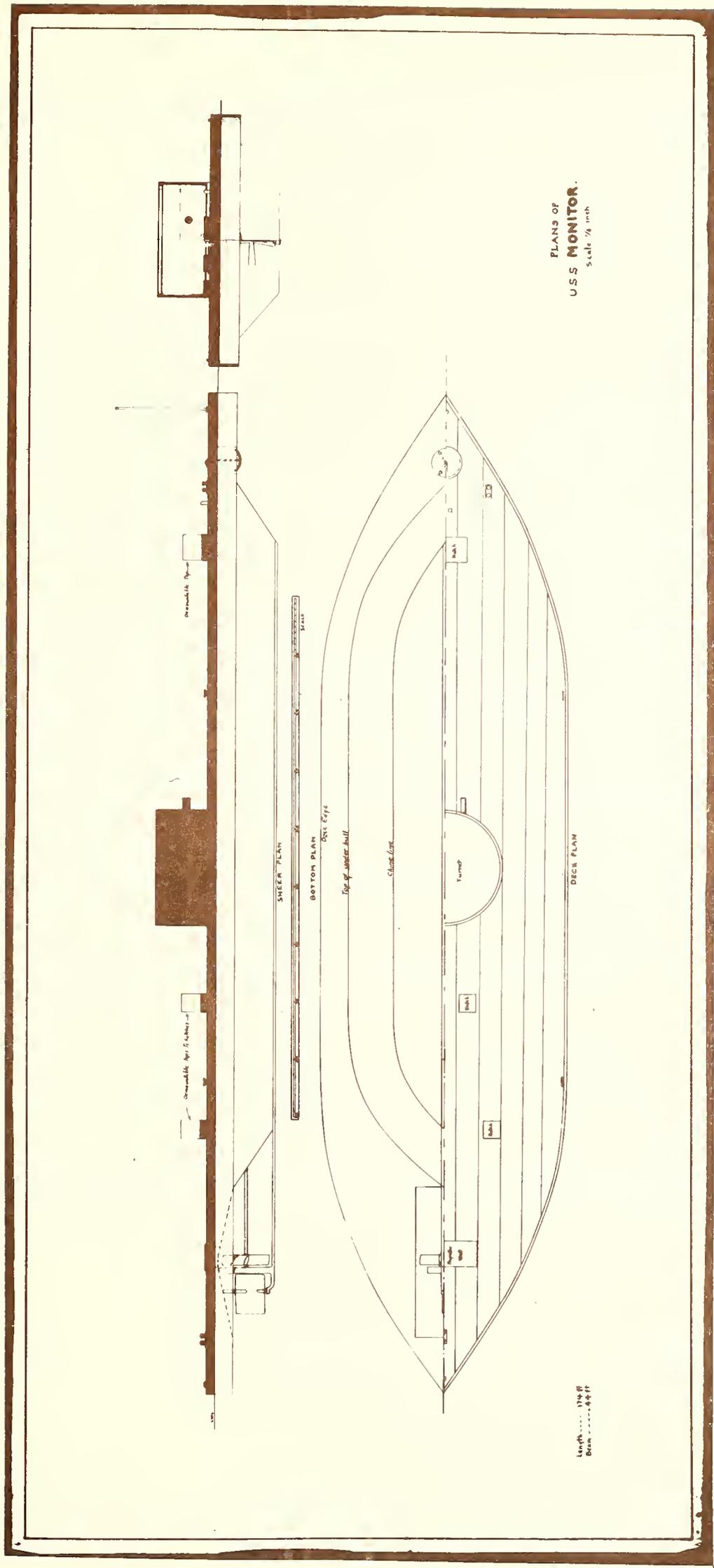
Record Group 19, Ship Plans, U.S.S. *Monitor* Drawing 26-8-19A

Publication:

Edward M. Miller, editor *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

Remarks:

This drawing illustrates three views of the *Monitor*; "Sheer Plan, Bottom Plan and Deck Plan," and the stern body plan. The upper half of the deck plan shows the hull lines, which are designated the "Deck Edge, Top of underhull, and Chine line." The drawing omits the berth deck hatch but shows the pilothouse, blower pipes, and the smoke pipes as all being removable. The pilothouse, of course, was bolted to the deck beams. The double bits shown fore and aft and the deck edge cleats are not seen on photographs of the *Monitor*. The rudder has an aspect ratio similar to that of Catalog Drawing 13. The propeller race is shown erroneously as having a rectangular cross section. The length, 174 feet and beam, 44 feet, disagree with the historical dimensions of 173 feet and 41 feet 4 inches respectively.



33. "PLANS OF U.S.S. MONITOR" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 34

Title: "SKETCH OF ORIGINAL 'MONITOR' "

Date of Subject:

Late 1862

Draftsman/Life Dates:

Unknown

Medium: Ink on tracing cloth.

Size [Sheet]:

20 1/4 inches by 31 1/8 inches

Size [Sight]:

18 3/8 inches by 29 3/8 inches

Inscribed:

Title Block / Caption: "Information from which this sketch was made was obtained from the 'Scientific American' Mar. 22nd 1862 and from 'Battles and Leaders of the Civil War,' Vol. 1, Page 731, and from Model in the National Museum Washington, D.C."

Scale: "1/8" = 1 Foot (Full Size for Model)"

Notes:

"This sketch was made in connection with models for use in *Outline of American Naval History*."

Rendered: "Navy Yard, Washington, D.C., Jan. 16th, 1917"

Original:

Location: National Archives

Identification:

Records Group 19, Ship Plans, U.S.S. *Monitor* Drawing No. 26-8-18B

Condition: Good

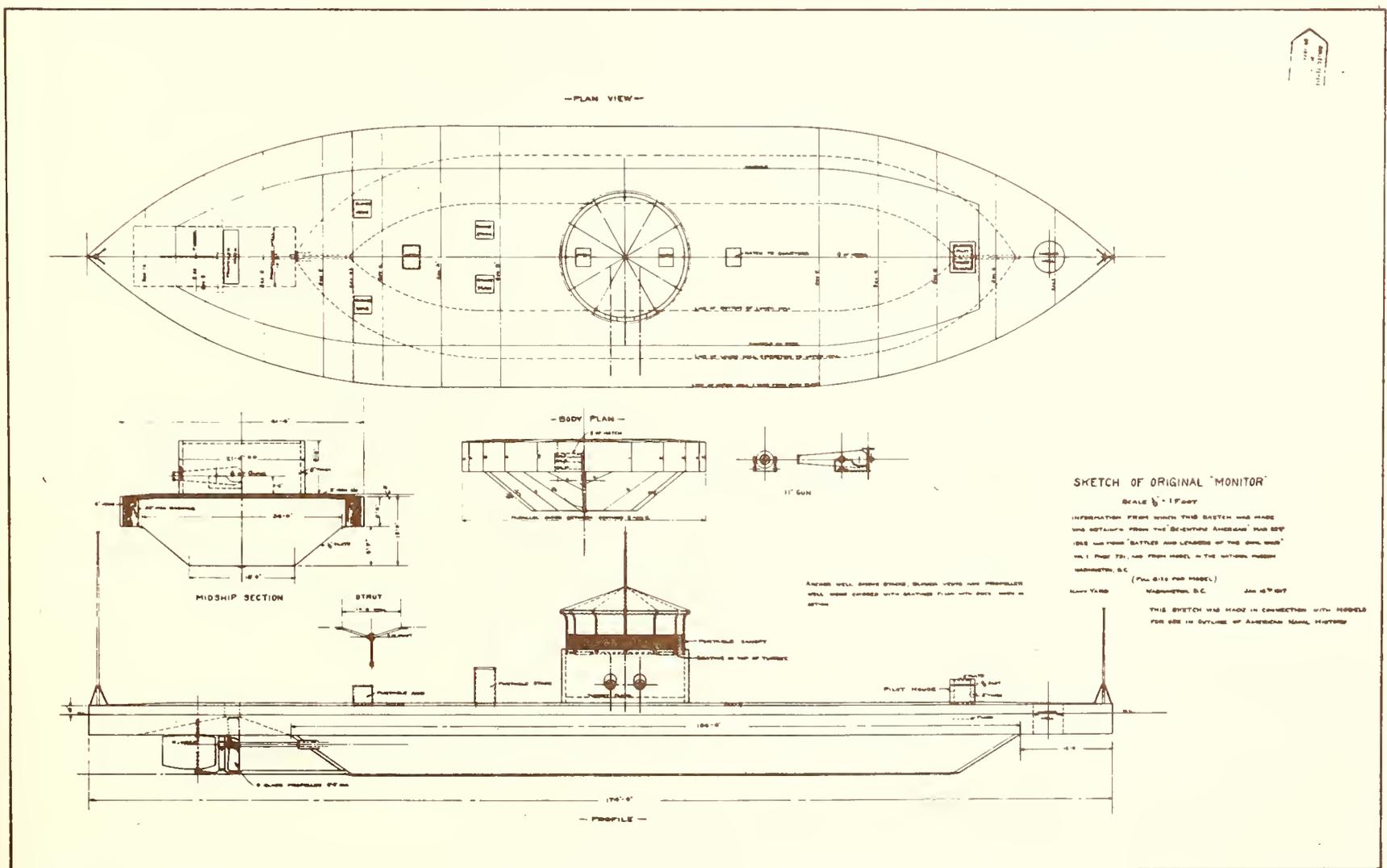
Publication:

Edward M. Miller, editor *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

Remarks:

This drawing shows the deck plan, outboard profile, a body plan, and a transverse section through the turret. The engine room hatch is misplaced on the centerline. The netting around the turret awnings is conjectural. The stern and stern of the underbody of the

hull are drawn incorrectly as projections where the original drawings indicate that the hull plates were merely bent. The *Monitor* had no propeller shaft stern tube as shown, and the propeller race cross section and plan views are shown incorrectly. Many of the dimensions are at variance with original *Monitor* drawings. Only the "smoke stacks" and "blower" vents were covered with gratings in action. The other hatches were covered with iron hatch covers.



34. "SKETCH OF ORIGINAL 'MONITOR' " (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 35

Title: "LINES/U.S.S. MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Sumner Bradford Besse (1902-)

Medium: Blueprint

Size [Sheet]:

16 5/8 inches by 70 1/4 inches

Size [Sight]:

15 5/8 inches by 69 1/2 inches

Inscribed:

Title Block/Caption: "Lines-U.S.S. Monitor
The Mariners Museum
Newport News, Virginia"

Scale: "1/4 inch = 1 foot"

Notes:

See illustration.

Signature/Initials: "S.B.B."

Rendered: April 2, 1934

Original:

Location: Mariners Museum

Identification:

Plate, Figure 9

Condition: Excellent

Publication:

S.B. Besse, *U.S. Ironclad Monitor*, Museum Publication No. 2, Newport News, Va.: Mariners Museum, 1936.

Remarks:

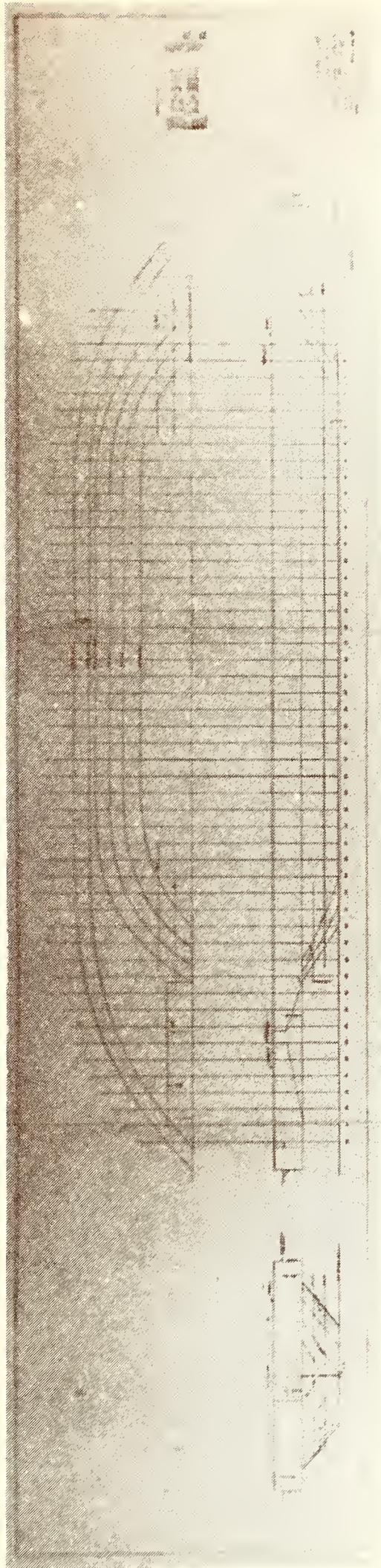
Besse's interpretation of the very small drawing available in 1934, Catalog Drawing 16, is remarkable, and the deduced dimensions are quite exact in many instances. Some differences from the original configuration are a result of the small data base then

available. The hull lines of this drawing vary somewhat from those of Catalog Drawings 8, 9, and 10, which specify the waterplanes of the armor belt and lower vessel as concentric arcs forward and with centers for the armor belt and lower vessel aft displaced. The original propeller raceway is concave, but this drawing indicates a flat surface. The trailing edge exits the hull as a straight line rather than in an arc.

Besse's frame number "8" coincides with Ericsson's frame number "1".

A comparison of Besse's dimensions and those deduced from Ericsson's drawings follows:

Dimension	Besse	Ericsson
Length of overall	173'	173'
Length of shell	165'	165'
Length of shell at 6' 6" W.L.	124'	124'
Length of shell at baseline	103'	102' 8"
Beam extreme	41' 6"	41' 4"
Beam of top of slanting sides	34'	34'
Beam at baseline	18'	18'
Draft	10' 1 1/2"	10'
Camber	4"	4"
Width of flat of deck	21' 4"	20'



35. "LINES/U.S.S. MONITOR" (Mariners Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 36

Title: "DECK ARRANGEMENTS — O.B. [Outboard] PROFILE AND SECTIONS/U.S.S. MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Sumner Bradford Besse (1902-)

Medium: Blueprint

Size [Sheet]:

16 5/8 inches by 70 1/2 inches

Size [Sight]:

15 5/8 inches by 69 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/4 inch = 1 foot"

Notes:

See illustration.

Signature/Initials: "S. B. Besse"

Rendered: "April 2, 1934"

Original:

Location: Mariners Museum

Identification:

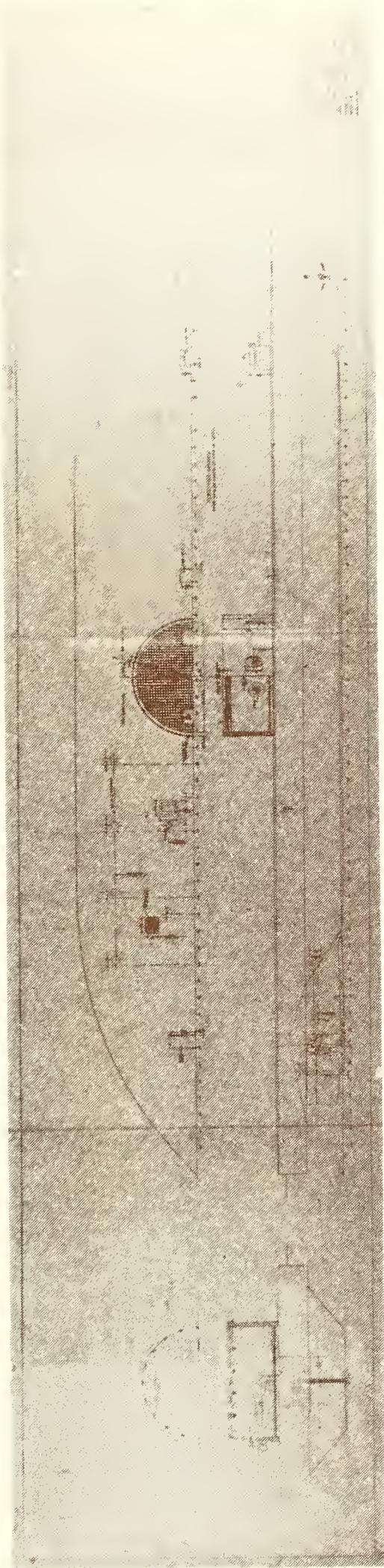
Plate, Figure 10.

Publication:

S.B. Besse, *U.S. Ironclad Monitor*, Museum Publication No. 2 Newport News, Va.: Mariners Museum, 1936.

Remarks:

The deck arrangements do not include the deck lights, deck rings, railings, or flag masts. The ash hatch aft of the port smokestack should be as large as the coal chutes. The engine-room hatch is omitted aft of the starboard smokestack. The propeller post, shown in the stern view of the body as a T-shaped structure, should be Y-shaped as shown in the drawing of the stern arrangements in Catalog Drawing No. 88. This drawing shows for the first time the profile of the keel as it tapers into the bow and stern. The gunports also indicate that they are bored radially, whereas it is known that the ports were drilled parallel to the diameter of the turret to coincide with the motion of the guns in their carriages.



36. "DECK ARRANGEMENTS O.B. [Outboard] PROFILE AND SECTIONS /
U. S. S. MONITOR" (Mariners Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 37

Title: "INTERIOR PLAN AND LONGITUDINAL HALF-SECTION OF THE FORWARD HALF OF THE MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

6 1/2 inches by 10 inches

Size [Sight]:

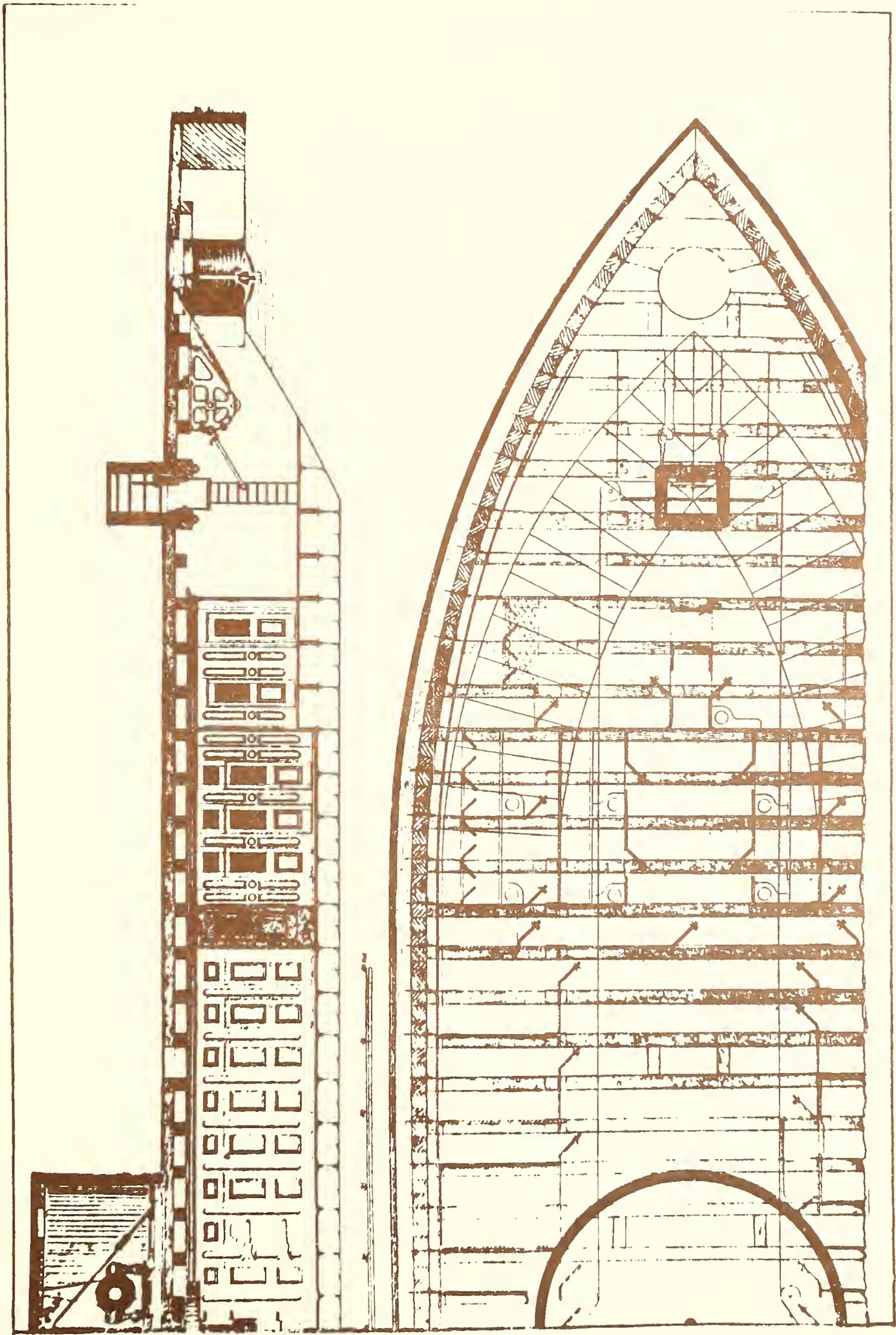
6 1/2 inches by 10 inches

Publication:

George Allenson, "The Monitor," *Model Craftsman*, 5, (February, 1937), p. 9.

Remarks:

The inboard profile of this drawing and the after half of Catalog Drawing 38, which follow, is almost identical with Catalog Drawing 29. Part of the plan of the starboard side has been deleted. The author of the article gives no source for the drawing.



37. "INTERIOR PLAN AND LONGITUDINAL HALF-SECTION OF THE FORWARD HALF OF THE MONITOR" (Model Craftsman)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 38

Title: "INTERIOR PLAN AND LONGITUDINAL HALF-SECTION OF THE AFTER HALF OF THE MONITOR."

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

6 1/2 inches by 10 inches

Size [Sight]:

6 1/2 inches by 10 inches

Inscribed:

Title Block/Caption: See title.

Notes:

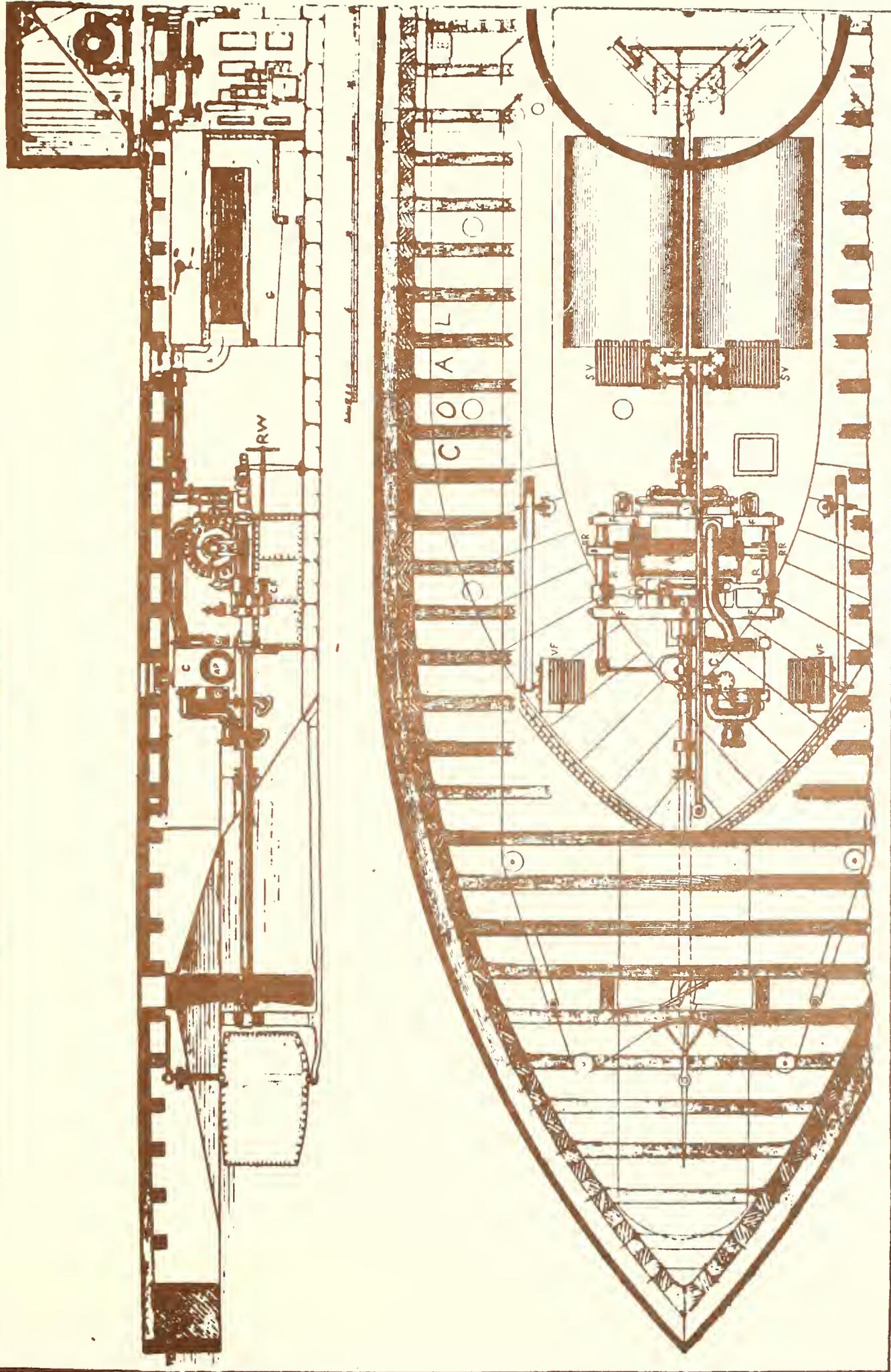
"C" - [condenser]
"AP" - [air pump]
"CK" - [crank]
"RR" - [rocker shaft and connecting rods]
"RW" - [reversing wheel]
"G" - [grate]
"A" - [main engine]
"F" - [engine frame]
"SV" - [smoke hatch]
"VF" - [blower hatch]
"COAL"

Publication:

George Allenson, "The Monitor", *Model Craftsman*, 5, (February 1937), p. 10.

Remarks:

The inboard profile of this drawing has a close resemblance to that of Catalog Drawing 29. The author of the article that contained this drawing has made some annotations as shown in the "Notes" above. The article makes no statement as to the source of the original drawing. The condenser discharge and sea injection pipes are shown on the port side in the plan view but are most likely connected to the shell plating on the starboard side.



38. "INTERIOR PLAN AND LONGITUDINAL HALF-SECTION OF THE AFTER HALF OF THE MONITOR" (Model Craftsman)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 39

Title: "U.S.S. MONITOR 1862"

Date of Subject:

March 9, 1862

Draftsman/Life Dates:

Dana M. Wegner (1947-)

Medium: Black ink on paper.

Size [Sheet]:

14 inches by 20 inches

Size [Sight]:

11 7/8 inches by 16 7/8 inches (est.)

Inscribed:

Scale: None; scale of feet on drawing.

Notes:

(See illustration.)

Signature/Initials: "D. M. Wegner 1971"

Rendered: 1971

Original:

Location: Collection of Dana M. Wegner

Publication:

Edward M. Miller, editor *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

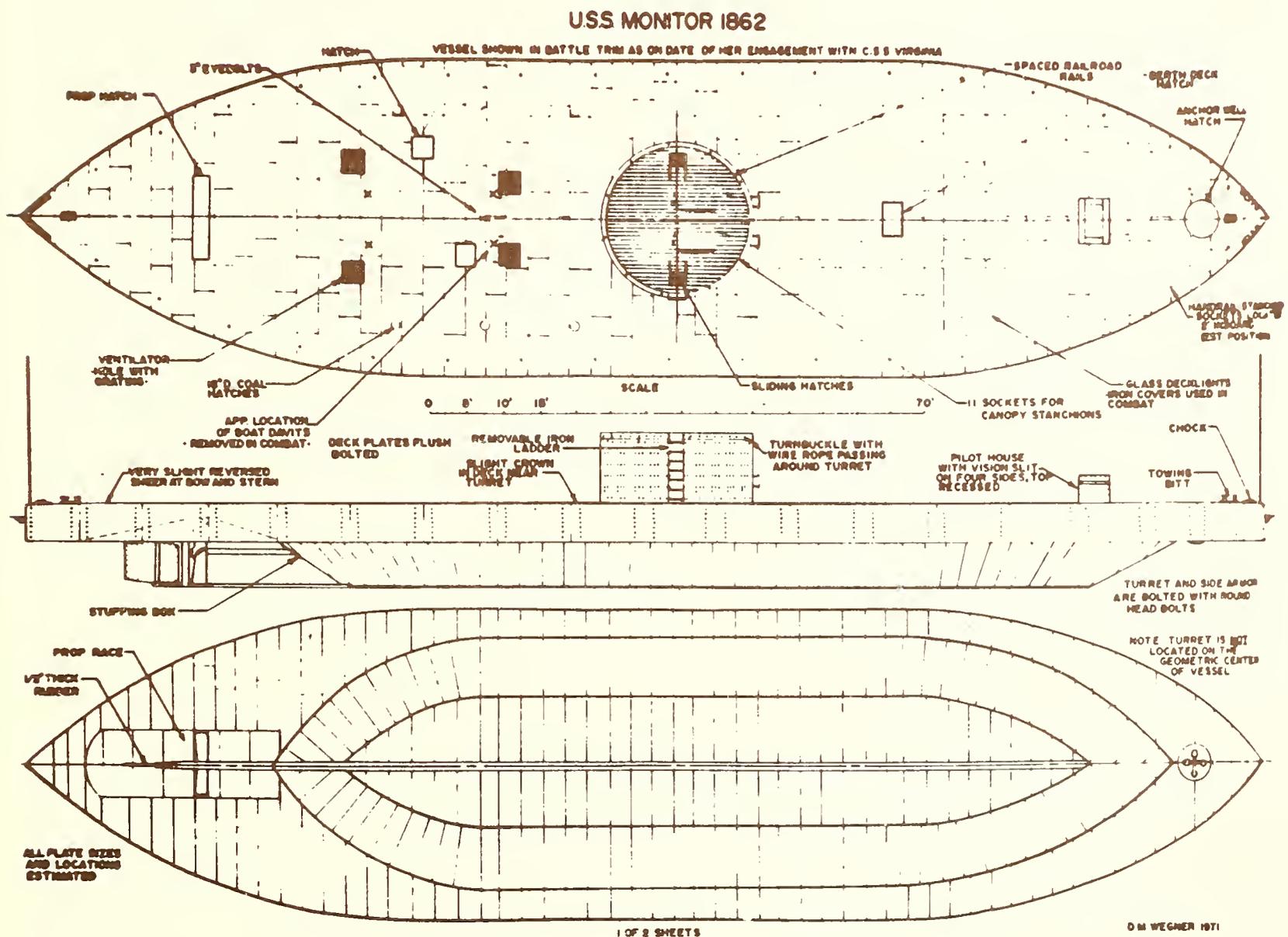
Remarks:

This drawing was made for the International Plastic Modellers Society. As the drawing notes, the hull plate sizes were estimated but do not match the information now available. There are some differences in the deck hatch and deck fitting locations and the historical record. The hatch indicated aft of the port smoke pipe is in the place occupied by the temporary stove shown in the Civil War photograph of the crew cooking on deck (Library of Congress Photograph 539, "James River, Va., July 9, 1862," by James F. Gibson). Close inspection of the photograph shows the stove sitting on bricks above the deck, indicating that there is no hatch underneath.

The drawing also indicates four boat davits between the smokestacks and the blower pipe hatches. The idea of the boat davits may have been picked up from the same photograph, which shows the ash bucket crane aft of the port smokestack. The

Monitor's boats during this period (see Catalog Drawing 20) were lashed to the deck. The ash hatch aft of the port smokestack is not shown. The unidentified hatch aft of the starboard smokestack is the engine hatch.

The length overall appears to be approximately 179 feet and the extreme beam 42 1/2 feet instead of the traditional 173 feet and 41 feet 4 inches respectively.



39. "U.S.S. MONITOR 1862" (Dana M. Wegner)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 40

Title: "DETAILS PLANS/U.S.S. MONITOR 1862"

Date of Subject:

March 9, 1862

Draftsman/Life Dates:

Dana M. Wegner (1947-)

Medium: Black ink on paper.

Size [Sheet]:

14 inches by 20 inches

Size [Sight]:

11 1/4 inches by 15 7/8 inches (est.)

Inscribed:

Scale: None; scale of feet on drawing

Notes:

(See illustration)

Signature/Initials: "D. M. Wegner 1971"

Rendered: 1971

Original:

Location: Collection of Dana M. Wegner

Publication:

Edward M. Miller, editor *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974.

Remarks:

This is the second of two drawings made by Wegner for the International Plastic Modeller Society. The drawing contains details of deck fittings, the turret, anchor, and a transverse section of the hull. The drawing for the "canopy stanchions" and "boat davits" resembles the ash hatch crane. The rope stanchions for the turret are not quite the shape as indicated, not making a full quadrant of a circle. The square smoke and blower pipes are shown as the same height, but the blower pipe was 2 feet shorter than the 6-foot smokestack. The turret rivets pattern shows a symmetrical distribution around the gunports in variance with the original design.

TRANSVERSE SECTIONS AND BULKHEADS

Numbers 41-87

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 41

Title: "TRANSVERSE SECTION OF THE 'MONITOR' "

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, yellow, brown and red ink on manila paper.

Size [Sheet]:

23 3/4 inches by 41 3/8 inches (est.)

Size [Sight]:

16 3/4 inches by 41 3/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = 1 Foot"

Notes:

"321 sq. ft." [in port door]

"Made by C. W. M." [in pencil]

"Monitor" "C.W.M." [in ink]

Signature/Initials: "C.W.M."

Rendered: October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification:

Drawing No. 15(144)

Condition: Edges are browned and cracked. Small pieces missing. Edge cracks repaired with transparent tape.

Publication:

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978.

Remarks:

This drawing of the transverse section of the hull and turret by MacCord must be one of the first truly representative views of the *Monitor's* turret, drive, and supporting hull

section. It bears common features of Catalog Drawing 7, showing the spherical shot being deflected by the various surfaces of the ship. This may have been a companion piece to the first longitudinal and plan views shown in Catalog Drawing 8.

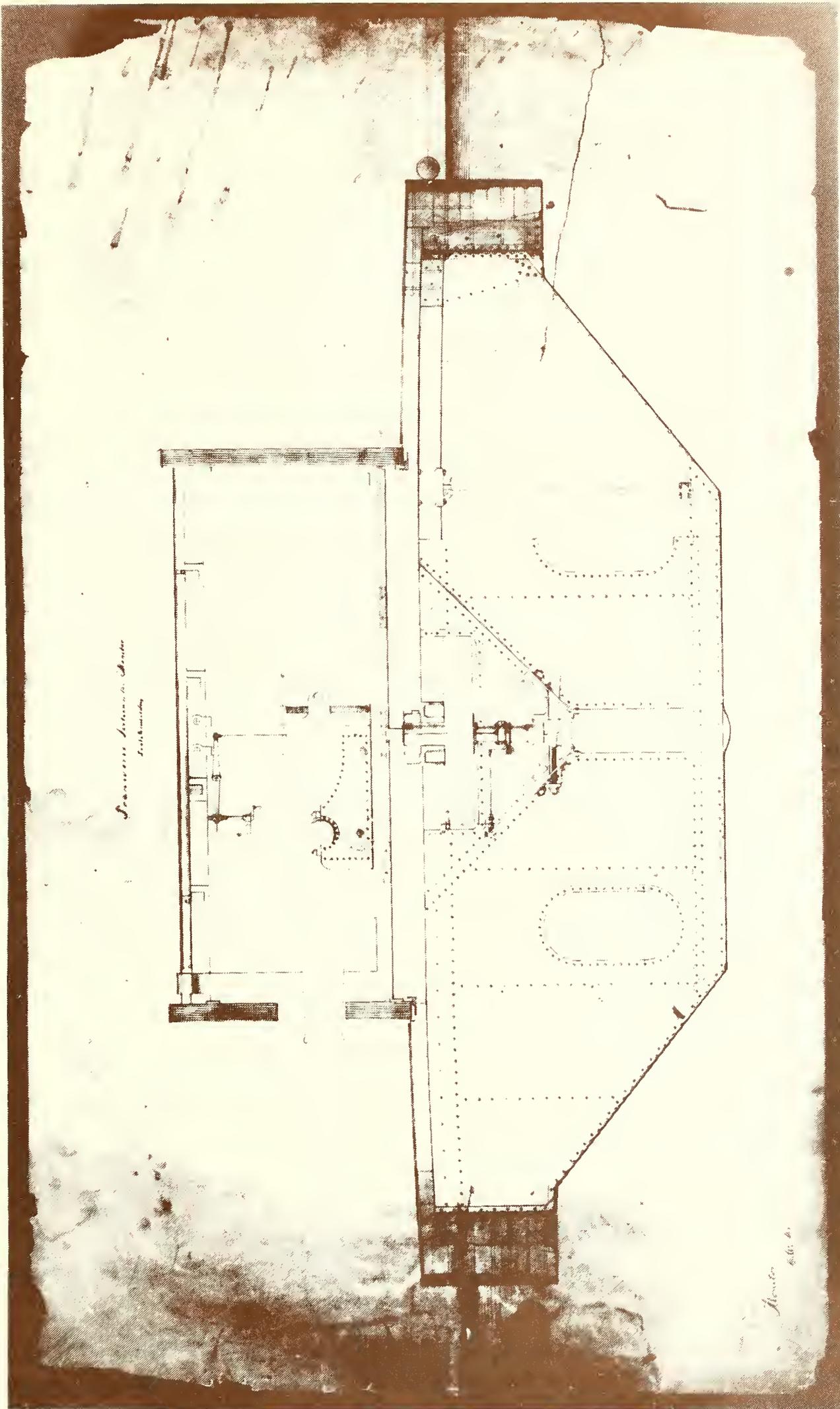
The color coding used shows:

Armor	Blue
Shell Plating	Blue
Oak	Light Brown
Pine	Yellow
Wrought iron turret floor beam	Brown
Brass	Red

The turret drive throttle and reversing gear are shown very clearly. The Turret Officer's sight hole can be seen just to the left of the control handle. Three such holes can be seen on the photographs of the turret¹ and usually have a line running through them to the turret roof above. This may have been a signal or a bell lanyard.

Footnotes:

¹ James River, Virginia, July 9, 1862. By James Gibson. LCB8171-660.



41. "TRANSVERSE SECTIONS OF THE 'MONITOR'" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 42

Title: "TRANSVERSE SECTION OF THE ARMOR GUNBOAT MONITOR"

Date of Subject:

ca. mid-1862

Draftsman/Life Dates:

Unknown

Medium: Black and white photograph.

Size [Sheet]:

8 inches by 10 inches

Size [Sight]:

5 1/2 inches by 9 1/2 inches

Inscribed:

Title Block/Caption: "TVAR SECTION AF PANSAR KANONBATEN
MONITOR"

Scale: 3/4 inch = one foot ["Scalen 3/4 tum pa foten"]

Notes:

This drawing bears a Swedish museum stamp in reverse:

"KRIGSAKIVET"

"30/1957"

"Utländska Fartyg

"Kra. N^o 1: Box U.2.

Sjöh Mus. Arkiv Ö"

R N:r 4724:3."

Original:

Location: Division of Naval History
Smithsonian Institution

Identification:

Photograph No. 62818

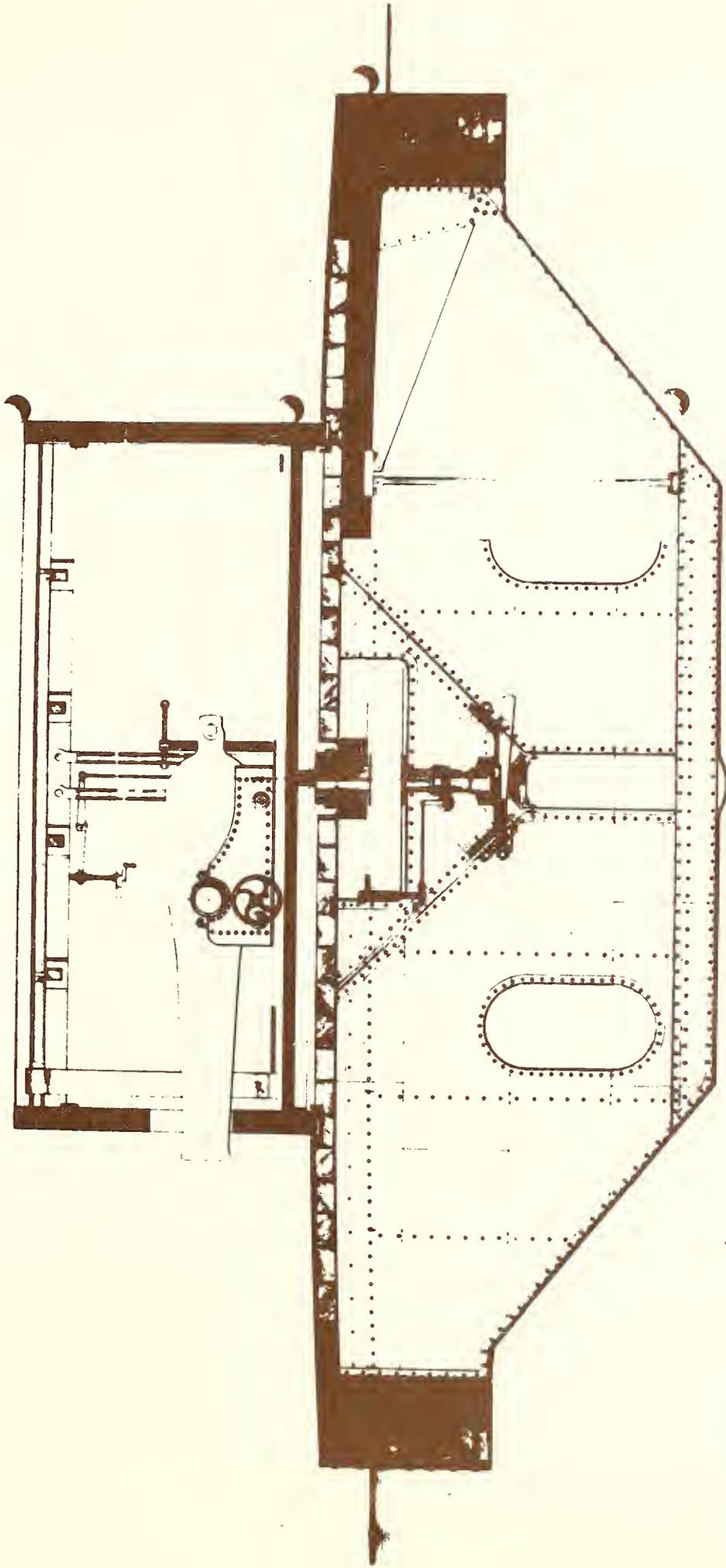
Publication:

"The Elusive Ironclad, *Monitor*," *Sea Classic*, 7, (September, 1974), p. 36.

Remarks:

This drawing is one of four acquired by Dr. Lundeberg of the Smithsonian from the War Museum in Stockholm in the early 1960s and is similar to Catalog Drawing 41 by Charles William MacCord, including the location of the shot striking the various armored surfaces of the ship. "Utländska Fartyg" means "foreign ship." The original drawing sheet size is estimated to be 20 1/4 inches by 35 1/4 inches.

Air Section of Porter Gunboat Monitor.
From the War of 1861.



From the War of 1861.

42. "TRANSVERSE SECTION OF THE ARMOR GUNBOAT MONITOR"
(Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 43

Title: "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

ca. January 1862

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange-brown ink on tracing cloth.

Size [Sheet]:

17 1/2 inches by 27 1/2 inches

Size [Sight]:

10 1/2 inches by 23 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/2 inch = 1 foot" [Beam on waterline: 20 5/8 inches]

Rendered: Estimated ca. January 1862

Original:

Location: American-Swedish Historical Foundation Museum

Identification:

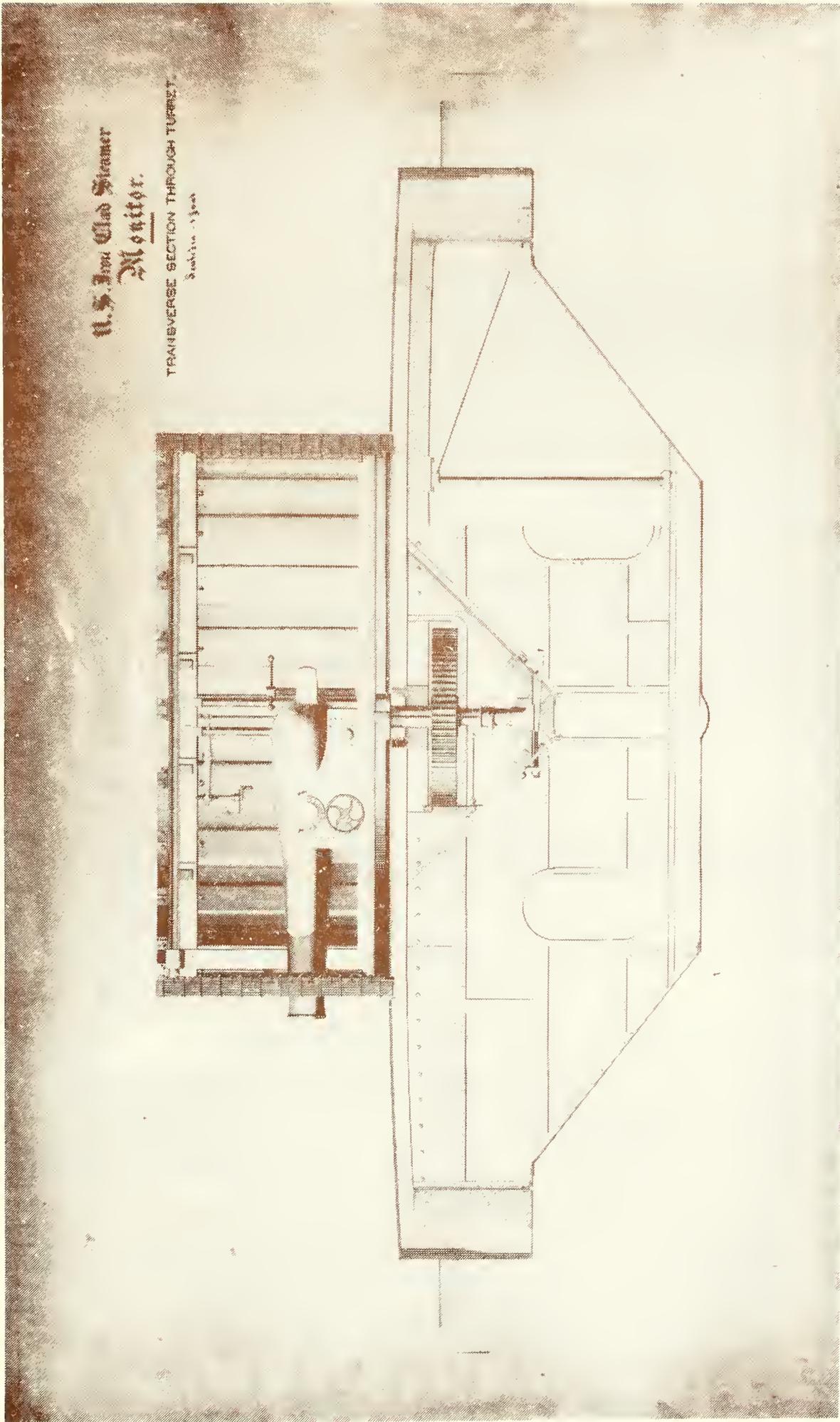
Catalog File No. 623.825, M74Un.
Original No. 1938:6000-210

Condition: Excellent, some browning around the edges.

Remarks:

This original drawing of the *Monitor* is framed and hangs in the "Ericsson Model Room" in the museum. This view of the vessel through the centerline of the turret shows the interior of the turret with the gun trained to starboard and the turret gear train and controls mounted on the main bulkhead.

This drawing and Catalog Drawing 14 may be one of the two most important *Monitor* drawings extant.



43. "U. S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (American-Swedish Historical Foundation)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 44

Title: "U. S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

mid-1862

Draftsman/Life Dates:

Gustavus Weissenborn (?-?)

Medium: Lithograph

Size [Sheet]:

15 inches by 24 1/2 inches (est.)

Size [Sight]:

11 inches by 22 1/8 inches (est.)

Inscribed:

Title Block/Caption: See title. "Transverse Section Through Turret"

Scale: "1/2 inch = 1 foot"

Notes:

"Designed by J. Ericsson 1861."

Rendered: mid-1862

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification:

No. 15(112)

Condition: Good, lower edge chipped.

Publication:

F.M. Bennett, "The United States Ironclad, 'Monitor'," *Cassier's Magazine*, XIII, (April, 1898).

George Allenson, "The Monitor," *Model Craftsman*, 5, (February, 1937).

Remarks:

This excellent drawing shows two turret features: internal nut guards running from the top to the bottom of the turret and bolted by a single nut at the top and bottom; and the

turret rope stanchion brackets bolted to the inside of the top of the turret. This drawing also shows the cross section of the turret armor and the arrangement of bolts and rivets used to fasten the plates together.

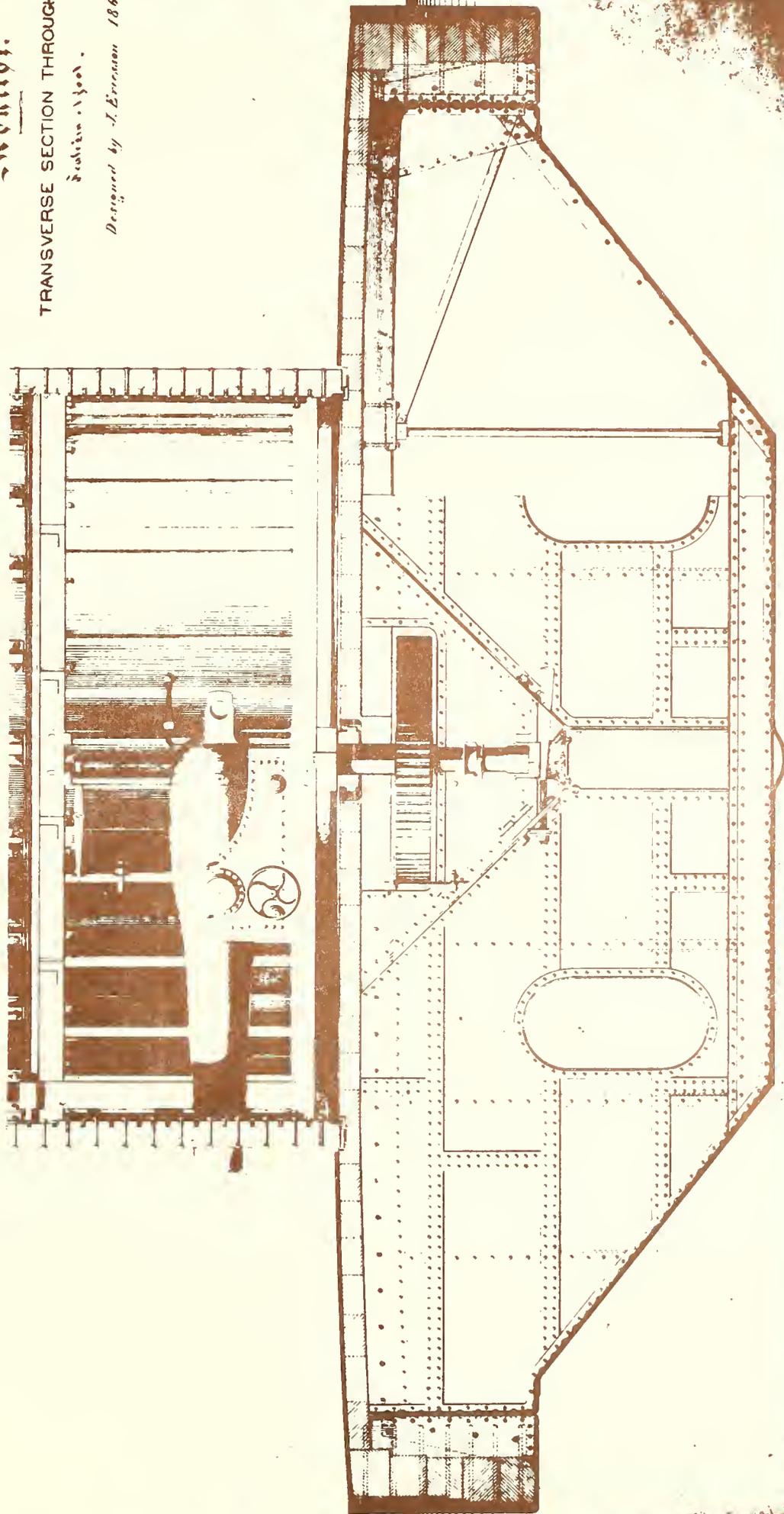
The draftsman's name, "Mr. Weissenborn," appears on the Stevens Institute index for the drawing, which states, "Lithograph from drawing by Mr. Weissenborn."

U. S. Iron Clad Steamer
Monitor.

TRANSVERSE SECTION THROUGH TURRET

Scale 1/4" = 1'.

Designed by J. Ericsson 1861.



44. "U. S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 45

Title: "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

mid-1862

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red, yellow ink on tracing cloth.

Size [Sheet]:

14 1/4 inches by 24 3/4 inches

Size [Sight]:

10 1/2 inches by 28 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/2 inch = 1 foot"

Notes:

"Designed by J. Ericsson"

Rendered: Mid 1862

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

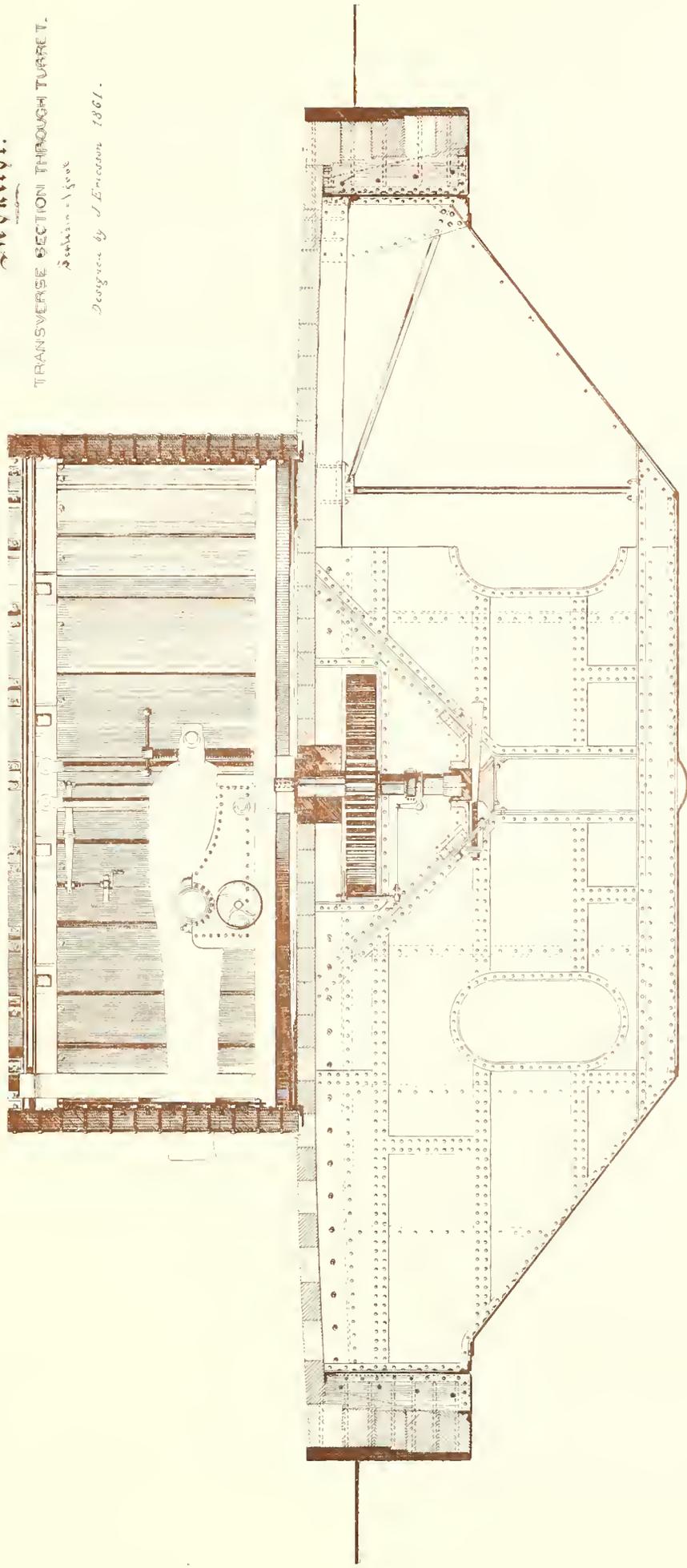
Although this drawing may be a tracing of Catalog Drawing 43, there are some minor differences in the lettering and the gun tube is not shaded. A blueprint of this drawing from the Warren E. Hill Collection has been deposited in the Mariners Museum.

U. S. Iron Clad Steamer
Merritt.

TRANSVERSE SECTION THROUGH TURRET.

Scale 1/3200

Designed by J. Ericsson 1861.



45. "U. S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 46

Title: "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

mid-1862

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red, and orange ink on tracing cloth.

Size [Sheet]:

14 3/4 inches by 25 1/2 inches

Size [Sight]:

10 1/2 inches by 21 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/2 inch = 1 foot"

Notes:

"Reduced from the original drawings of/Capt. John Ericsson./and from measurements made from the vessel."

"Constructed at Continental Works/Greenpoint, Brooklyn, N.Y."

"Date of Launch Jan 30th 1862."

"Date of Engagement with Merrimac March 9th 1862."

Signature/Initials: "Thomas F. Rowland"

"Warren E. Hill"

Rendered: Mid-1862 (?)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

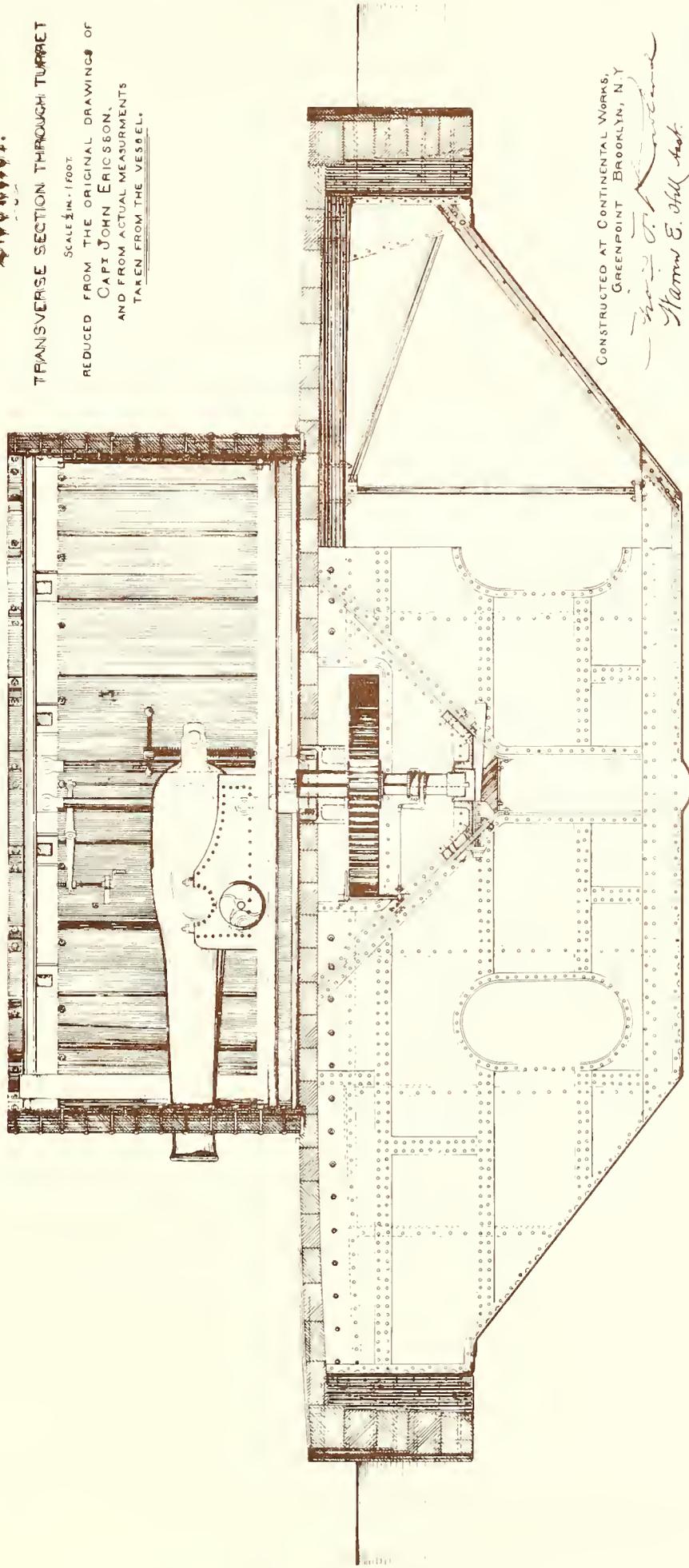
This drawing has been in the Rowland Family since the Civil War. The tracing appears to be a copy of Catalog Drawing 43 with a different treatment of the shading of the gun tube, and annotated and signed by Thomas F. Rowland and Warren E. Hill.

U. S. Iron Clad Steamer
Monitor.

TRANSVERSE SECTION THROUGH TURRET

SCALE 1/4 IN. = 1 FOOT.

REDUCED FROM THE ORIGINAL DRAWINGS OF
CAPT JOHN ERICSSON,
AND FROM ACTUAL MEASUREMENTS
TAKEN FROM THE VESSEL.



CONSTRUCTED AT CONTINENTAL WORKS,
GREENPOINT BROOKLYN, N. Y.

Wm. E. Hall
Master E. Hall

DATE OF LAUNCH JAN. 30th 1862
DATE OF ENGAGEMENT WITH MERRIMAC MARCH 9th 1862

46. "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (Thomas F. Rowland, Jr. Collection)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 47

Title: U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

mid-1862

Draftsman/Life Dates:

Unknown

Medium: Cyanotype photograph.

Size [Sheet]:

7 1/4 inches by 10 1/2 inches

Size [Sight]:

7 1/4 inches by 10 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/2 inch = 1 foot"

Notes:

"Reduced from the original drawings of/Capt. John Ericsson/and from actual measurements/taken from the vessel" [continued under "Remarks"]

Signature/Initials: "Thos. F. Rowland"
"Warren E. Hill, Asst."

Rendered: "March 15, 1898"

Original:

Location: Robert Rowland Coykendall Collection
Photographic Record of the Continental Iron Works

Identification:

Photograph No. 1142 of March 15, 1898.

Condition: Good

Publication:

Richard H. Webber, *Monitors of the U.S. Navy, 1861-1937*, Washington: Government Printing Office, 1969.

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 24.

Remarks:

This photograph shows the drawings evidently in the possession of the Continental Iron Works on March 15, 1898. This drawing of the transverse cross section is a companion to Catalog Drawing 16 and is a copy of Catalog Drawing 46.

Black and white copies of this photograph can be found in the following collections:

1. Robert Rowland Coykendall Collection — Office Album of the Continental Iron Works.
2. Naval Historical Center — Neg. No. 60660.
3. National Archives — Record Group 45, Office of Naval Records and Library, Subject file 1860-70, AD - Design and General Characteristics, Box 6, Folder 1861-1862, *Monitor*, U.S.S., "Transverse Section."

Record Group 77, "Index to Fort Plans, Guns & Equipment, A-E, B-Boats - Floating Batteries, Photographs, Continental Iron Works, Mar. 16, 1898", Transverse Section", Dr. 159, Sh. 52-2.

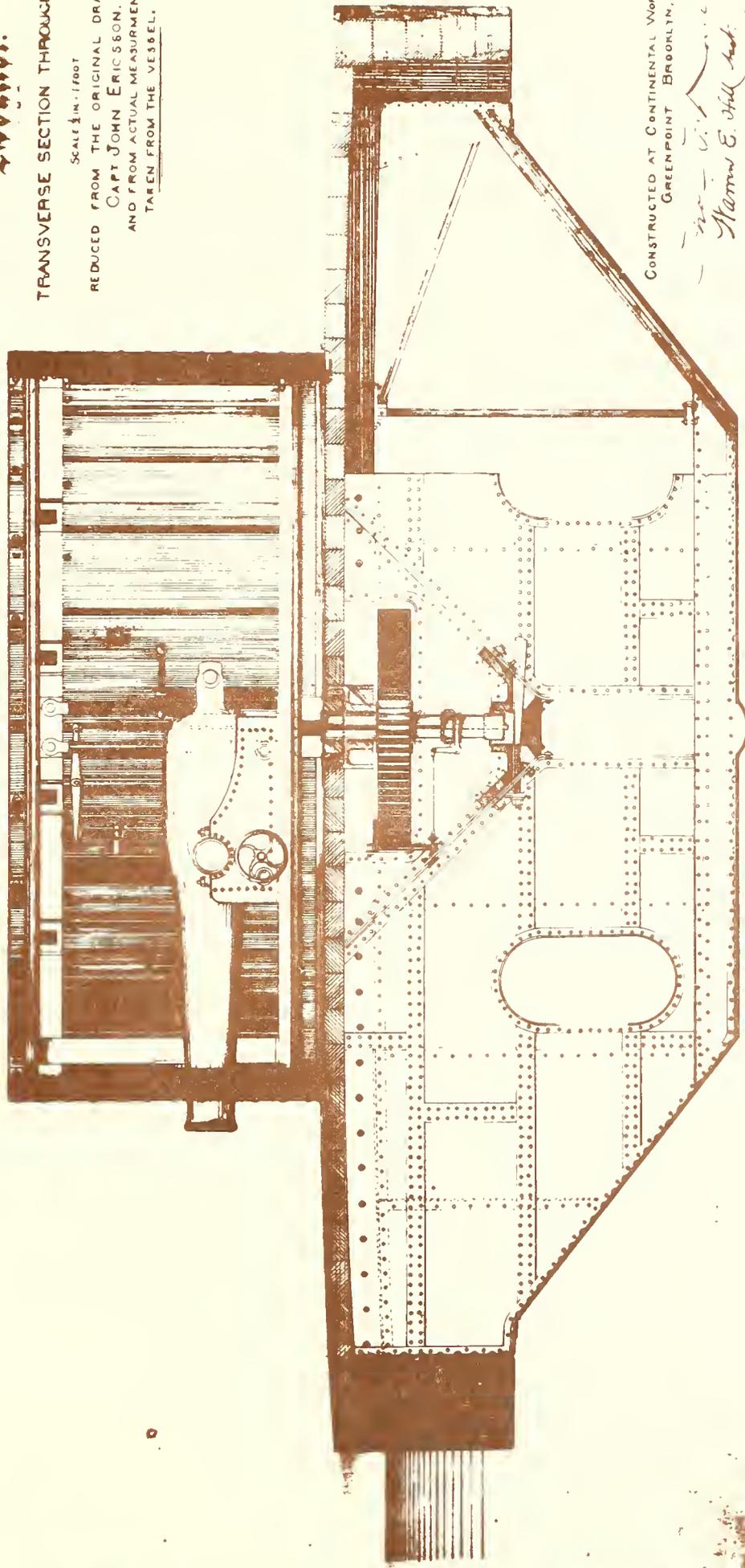
4. Mariners Museum — PN 274.

U. S. Iron Clad Steamer
Monitor.

TRANSVERSE SECTION THROUGH TURRET

SCALE 1/4" = 1'00"

REDUCED FROM THE ORIGINAL DRAWINGS OF
CAPT. JOHN ERICSSON,
AND FROM ACTUAL MEASUREMENTS
TAKEN FROM THE VESSEL.



CONSTRUCTED AT CONTINENTAL WORKS,
GREENPOINT BROOKLYN, N.Y.

Wm. E. Hill Archt.

DATE OF LAUNCH JAN 30th 1862
DATE OF ENGAGEMENT WITH MERRIMAC MARCH 9th 1862

MAR 15 1876

1142

47. "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (Robert Rowland Coykendall Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 48

Title: "U.S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET"

Date of Subject:

ca. mid-1862

Draftsman/Life Dates:

Unknown

Medium: Black and white photograph.

Size [Sheet]:

7 1/4 inches by 10 1/2 inches

Size [Sight]:

7 1/4 inches by 10 1/2 inches

Inscribed:

Title Block/Caption:

"Transverse Section Through Turret"

"Reduced from the original drawing of/Capt. John Ericsson/and from actual measurements/Taken from the vessel."

Scale: "1/2 inch = 1 foot"

Notes:

"Constructed at Continental Works/Greenpoint, Brooklyn, N.Y."

"Date of Launch, Jany 30th 1862/Date of Engagement with Merrimac, March 9th 1862"

Signature/Initials: "Thos. F. Rowland"

"Warren E. Hill, Asst."

Rendered: ca. mid-1862 (est.)

Original:

Location: Mariners Museum

Identification:

Photograph No. PN-274

Condition: Good

Publication:

S. B. Besse, *U.S. Ironclad Monitor*, Museum Publication No. 2 Newport News, Va.: Mariners Museum, 1936, Figure 2.

Remarks:

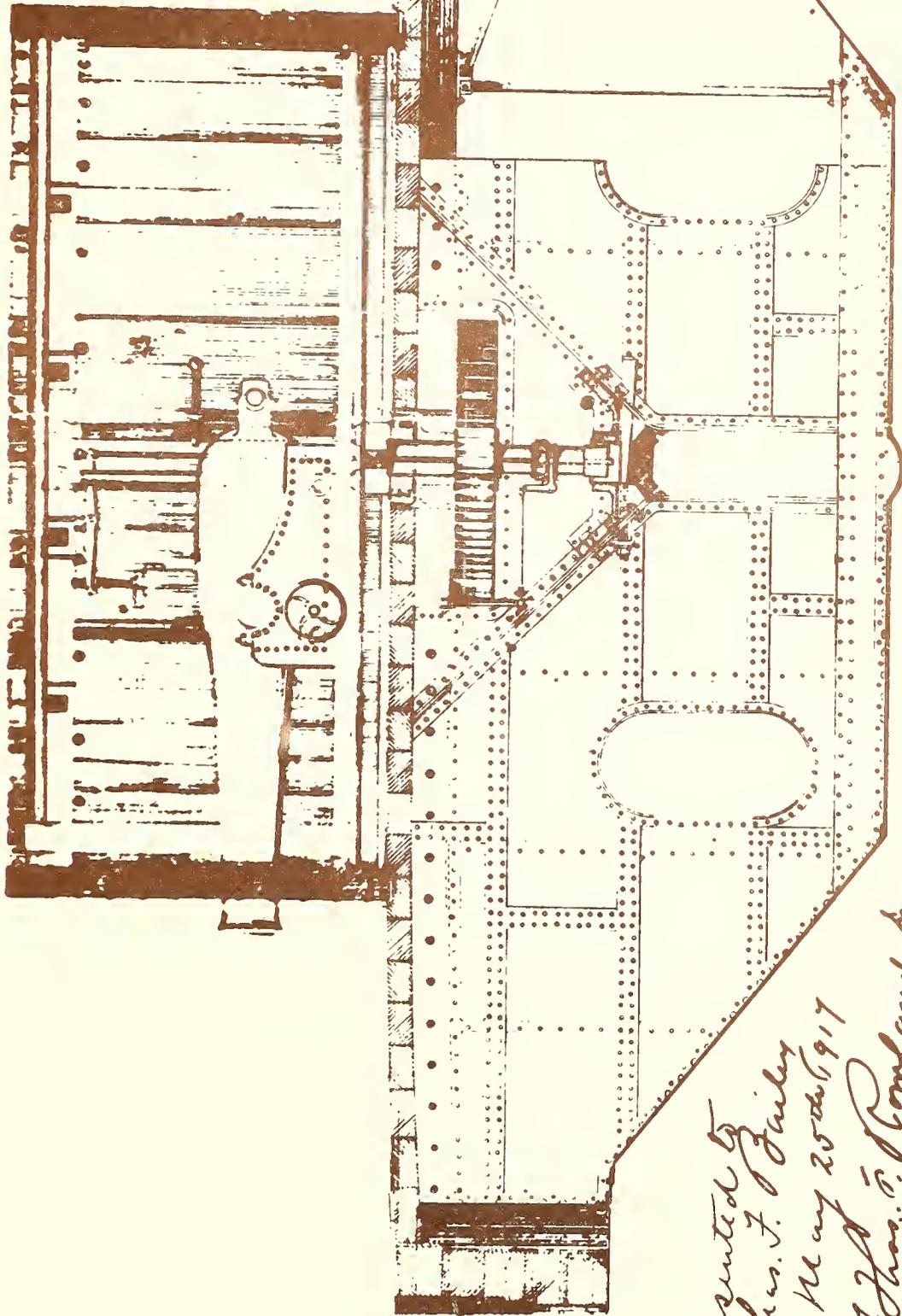
This is one of the two photostats given the Mariners Museum by Thomas F. Rowland, Jr., and autographed by him. Thomas F. Rowland, Jr., was the son of Thomas F. Rowland and one-time president of the Continental Iron Works. On May 25, 1917, he presented this autographed photostat to Mr. Charles F. Bailey, Chief Engineer of the Newport News Shipbuilding and Dry Dock Company and later vice-president of the Mariners Museum. In 1938 Mr. Bailey asked for the location of the original of this drawing. Mr. Rowland answered that it had been given to the Webb Institute of Naval Architecture "years ago."¹ The drawing is no longer in Webb's possession.

Footnotes:

¹ Thomas F. Rowland, Jr. to Charles F. Bailey, March 10, 1938. Mariners Museum Library Collection.

**U. S. Iron Clad Steamer
Monitor.**

TRANSVERSE SECTION THROUGH TURRET
 SCALE 1/4" = 1'-00"
 REDUCED FROM THE ORIGINAL DRAWING BY
 CAPT JOHN ERIE SEN
 AND FROM ACTUAL MEASUREMENTS
 TAKEN FROM THE VESSEL.



CONSTRUCTED AT CONTINENTAL WORKS
 GREENPOINT BROOKLYN, N. Y.

Merrimack
 DATE OF LAUNCH JAN. 30th 1862
 DATE OF ENGAGEMENT WITH MERRIMACK MARCH 9th 1862

*Presented by
 Chas. F. Zailer
 May 25th 1917
 By Thos. O. Rowland Jr.*

48. "U. S. IRON CLAD STEAMER/MONITOR/TRANSVERSE SECTION THROUGH TURRET" (Mariners Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 49

Title: "TRANSVERSE SECTION OF THE 'MONITOR' THROUGH THE CENTER OF THE TURRET"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Photo-engraving

Size [Sheet]:

7 1/2 inches by 11 inches

Size [Sight]:

1 5/8 inches by 3 1/4 inches

Inscribed:

Title Block/Caption: See title.

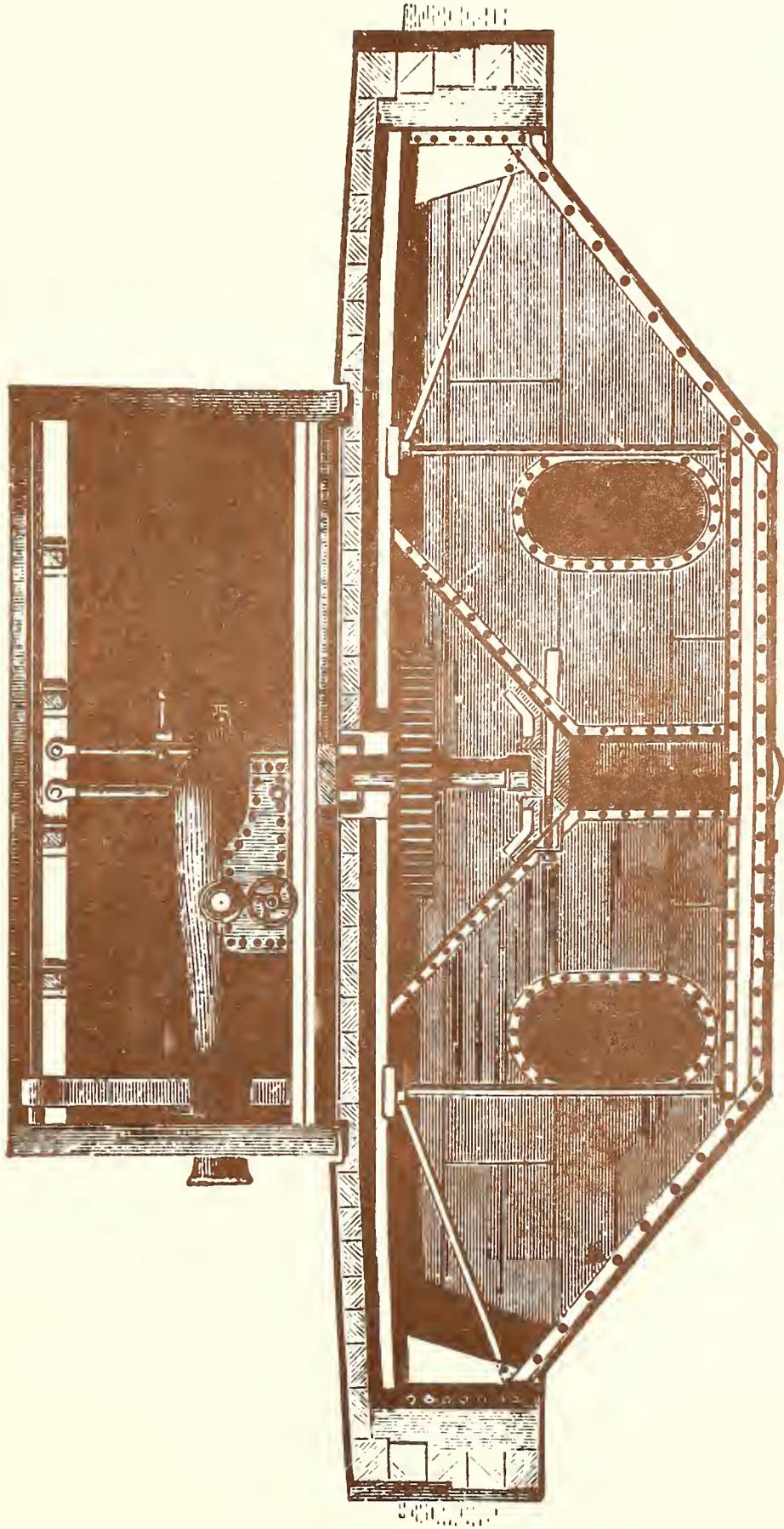
Rendered: ca. 1876

Publication:

John Ericsson, "The Building of the Monitors," *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New York: The Century Company, 4 volumes, 1887, p. 742.

Remarks:

"Made from a drawing lent by Capt. Ericsson." This drawing is probably a reverse of the transverse section shown in Catalog Drawing 26.



49. "TRANSVERSE SECTION OF THE 'MONITOR' THROUGH THE CENTER OF THE TURRET" (The Century Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 50

Title: "TRANSVERSE SECTION OF THE HULL OF THE ORIGINAL MONITOR"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

C. Wright (?-?)

Medium: Engraving

Size [Sheet]:

7 1/2 inches by 11 inches

Size [Sight]:

2 3/16 inches by 5 3/8 inches

Inscribed:

Title Block/Caption:

"The diagram gives a front view of the boilers and furnaces; also a side elevation of the rotating cylindrical turret which proved impregnable against ten-inch solid shot fired with battering charges at very short range."

Signature/Initials: "Wright"

Rendered: ca. 1886

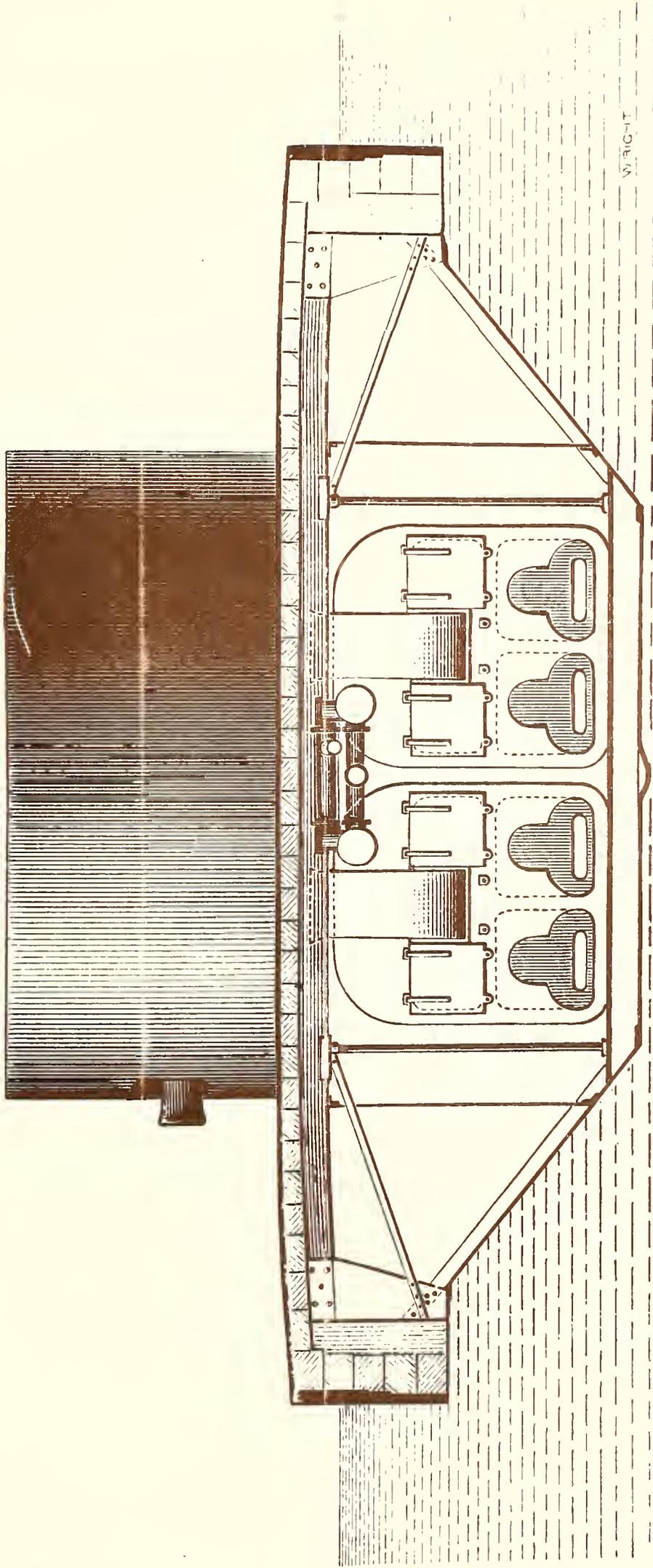
Publication:

John Ericsson, "The Monitors," *The Century Illustrated Magazine*, Vol. XXXI, New Series Vol. IX (November 1885-April 1886), p. 290.

John Ericsson, "The Building of the Monitor," *Battles and Leaders of the Civil War*, R.U. Johnson and C.C. Buel, eds., Vol. 1, New York: The Century Company, 4 volumes, 1887, p. 736.

Remarks:

This drawing shows a transverse section just aft of the boiler uptakes looking forward.



50. "TRANSVERSE SECTION OF THE HULL OF THE ORIGINAL MONITOR"
(The Century Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 51

Title: "TRANSVERSE SECTION THROUGH THE TURRET OF ORIGINAL 'MONITOR,'
1862"

Date of Subject:

ca. February 1862

Draftsman/Life Dates:

Unknown

Medium: Photograph of drawing.

Size [Sheet]:

4 inches by 8 1/2 inches

Size [Sight]:

5 1/2 inches by 7 inches

Inscribed:

Title Block/Caption: See title.

Rendered: ca. October 1862 (est.)

Original:

Location: National Archives

Identification:

Record Group 45, Office of Naval Records and Library Subject File 1860-70, AD - Design and General Characteristics, U.S. Ships, (Including *Monitor*, Box 6, Folder 1861-1862, AD *Monitor*, USS, Contracts, Specifications, Plans. "Transverse Section."

Condition: Good

Publication:

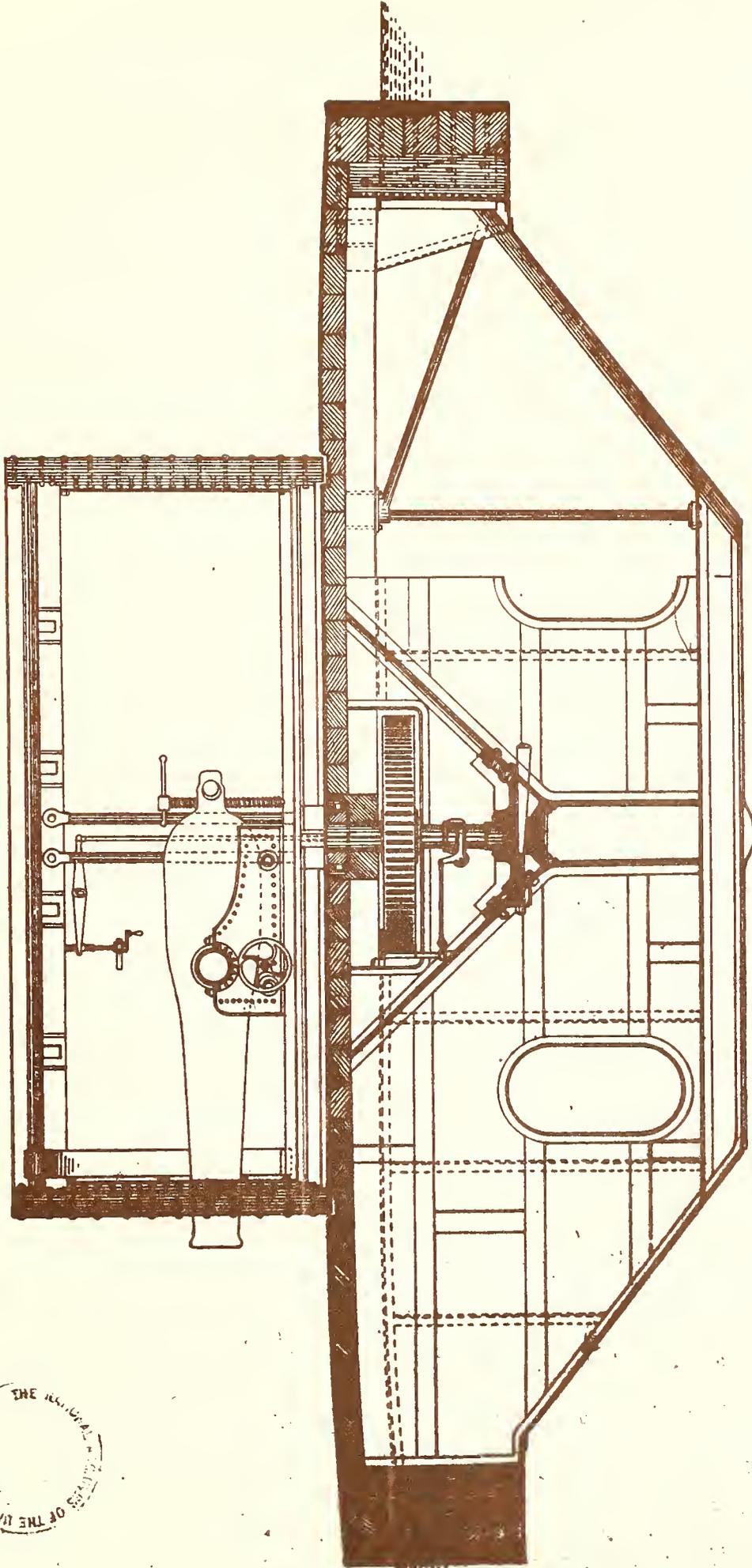
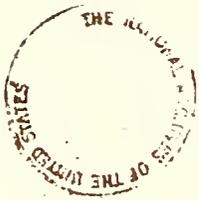
Official Record of the Union and Confederate Navies in the War of the Rebellion, Washington: Series I, Vol. 7, 1894-1922, p. 24b.

Alexander C. Brown, "Monitor-Class Warships of the United States Navy," *Historical Transactions, 1893-1943*, New York: Society of Naval Architects and Marine Engineers, 1945, p. 330.

Remarks:

This drawing is mounted on the same card as Catalog Drawing 30. The unique feature of this drawing is that the butt straps on the main bulkhead plating show no rivets.

A copy of this drawing can be found in the Mariners Museum Library, Photograph No. U-PN 567.



TRANSVERSE SECTION THROUGH TURRET OF ORIGINAL MONITOR.

51. "TRANSVERSE SECTION THROUGH THE TURRET OF THE ORIGINAL 'MONITOR,' 1862" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 52

Title: "THE ERICSSON BATTERY — MAIN BULKHEAD, FORWARD SIDE"

Date of Subject:

October 15, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red, and orange ink on tracing cloth.

Size [Sheet]:

18 1/2 inches by 28 1/2 inches

Size [Sight]:

15 inches by 26 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Notes:

"The beam a may be made thus."

"= The holes c and d will be marked from the casting."

"= Observe that the deck has no curvature for 20 feet, in order to accommodate the turret."

"= Angle irons for stiffening bulkhead to be placed on the aft side. All joints to be flush."

"= The plate f to run from door to door in one piece. All joints to be made as shown in the plan."

Rendered: "15th Oct. 1861"

Original:

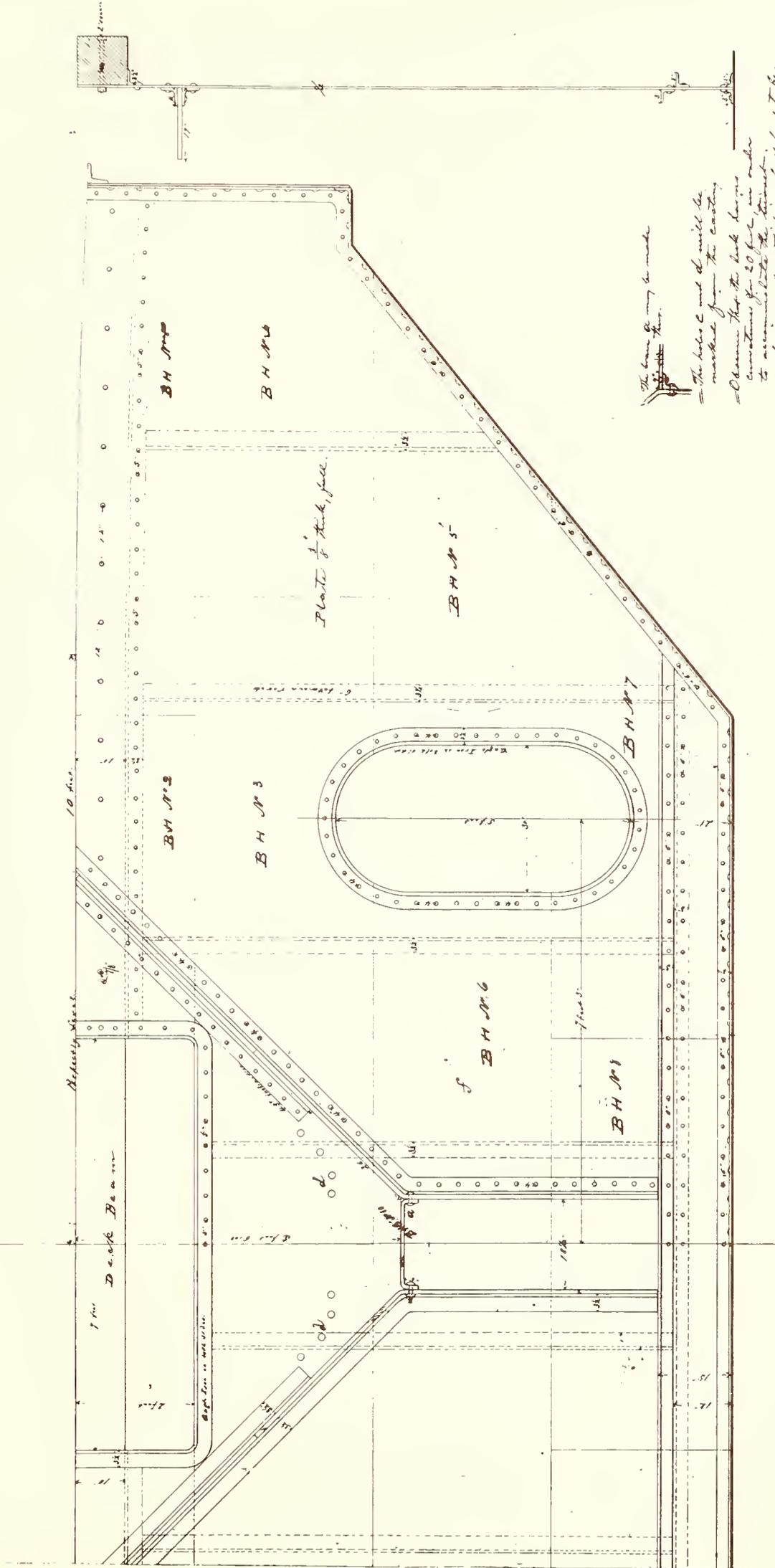
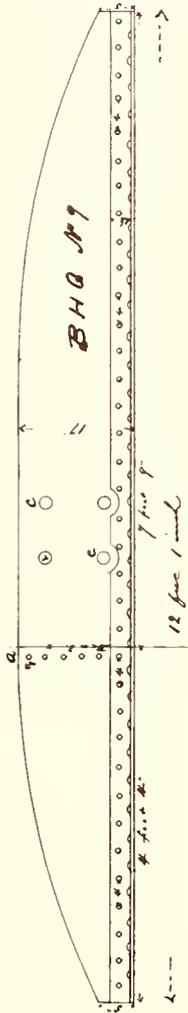
Location: Thomas F. Rowland, Jr. Collection

Remarks:

This drawing shows the plate numbering of the transverse bulkhead, including a set of notes. The drawing also shows the truss support for the turret shaft and key.

The Ericsson Battery Main Bulkhead, Forward Side.

Scale 1 inch = 10 feet. No. 1166.



The beam to be made
The hole C and d will be
marked from the center
Observe that the hole for the
connection for 20 feet in order
to accommodate the beam
to be made from the fore and
aft bulkheads. All joints to be
made with a double line of
rivets.

52. "THE ERICSSON BATTERY — MAIN BULKHEAD, FORWARD SIDE"
(Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 53

Title: "THE ERICSSON BATTERY — MAIN BULKHEAD FORWARD SIDE"

Date of Subject:

October 15, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, red, blue, and orange ink on tracing cloth.

Size [Sheet]:

18 1/2 inches by 28 inches

Size [Sight]:

15 inches by 26 1/2 inches

Inscribed:

Title Block/Caption: See title.

Notes: See Drawing. (Same as Catalog Drawing 52)

Rendered: "15th Oct. 1861"

Original:

Location: Thomas F. Rowland, Jr. Collection

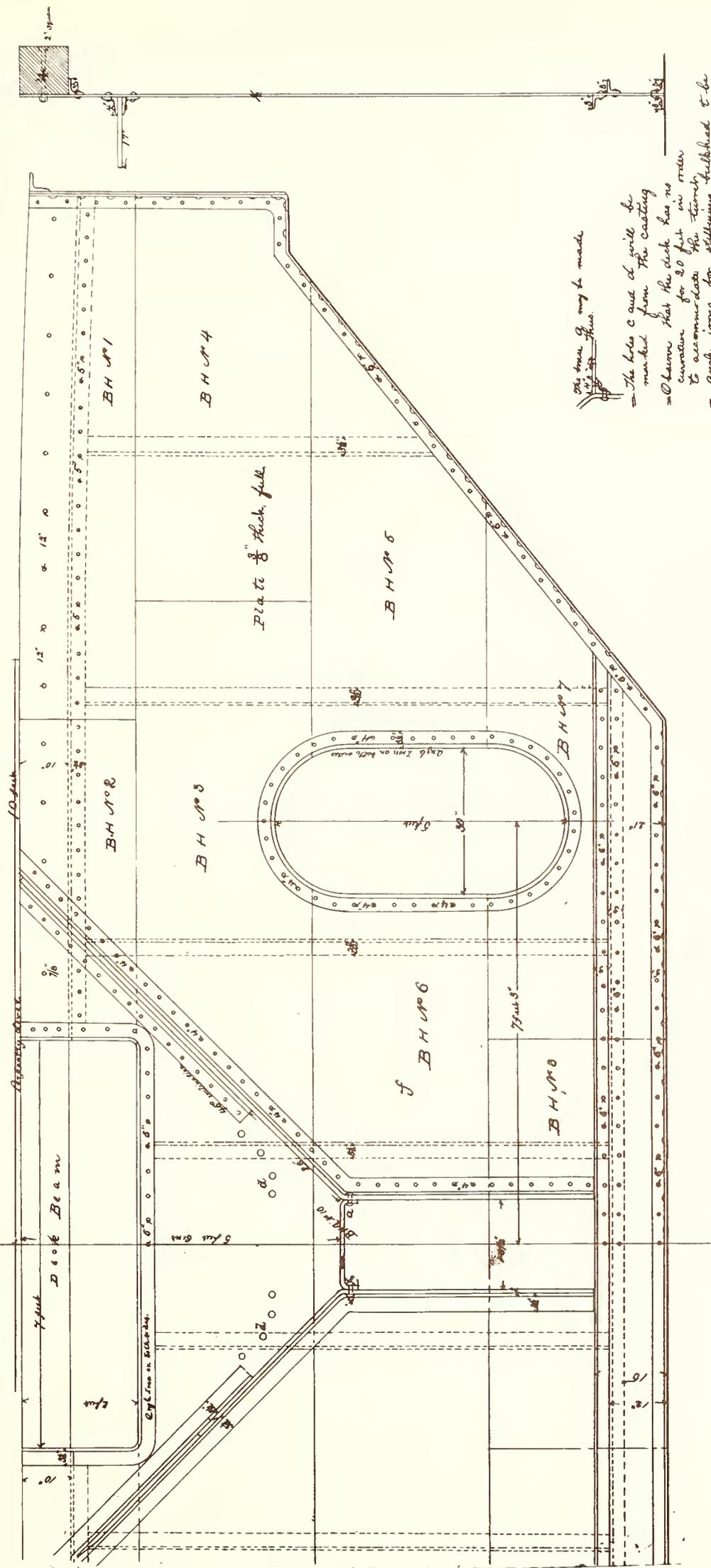
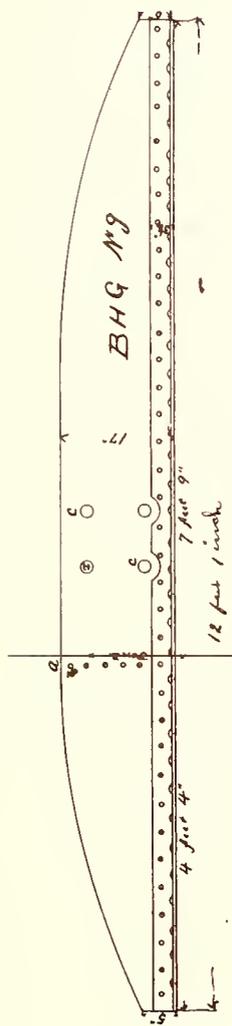
Condition: Good

Remarks:

This drawing is a tracing of Catalog Drawing 52.

The Ericsson Battery. Main Bulkhead Forward Side.

Scale 1 inch = 1 foot 15th Oct. 1861.



The iron g. may be made

- = The hole C and d will be marked from the casting
- = Observe that the disk has no curvature for 20 feet in order to accommodate the steam
- = angle irons for stiffening bulkhead to be placed on the aft side - All joints to be the plate to run from top to bottom in one frame
- = all joints to be made as shown in the plan

53. "THE ERICSSON BATTERY — MAIN BULKHEAD FORWARD SIDE"
(Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 54

Title: "CAPT. ERICSSON'S BATTERY. MAIN BULKHEAD"

Date of Subject:

October 15, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

19 7/8 inches by 33 5/8 inches (est.)

Size [Sight]:

16 inches by 32 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Signature/Initials: "Monitor/Capt. E." [pencil]

" 'Monitor'/Main Bulkhead/Capt. Ericsson" [Ink]

Rendered: "Oct. 15, 1861"

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 45(132)

Condition: Good, some speckling and a few stains.

Remarks:

This drawing shows the forward side of the main bulkhead, the plating, turret engine control rods, a plan and elevation of the turret shaft bracket, and a side view of the bulkhead.



54. "CAPT. ERICSSON'S BATTERY. MAIN BULKHEAD" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 55

Title: Main Bulkhead, Forward Side

Date of Subject:

November 11, 1861

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

18 1/4 inches by 26 1/2 inches

Size [Sight]:

15 inches by 25 inches

Inscribed:

Scale: 1 inch = 1 foot

Notes:

“Brace a may be made thus”

“Holes c and d marked from casting”

“Angle iron for Bulkheads to be placed on the after side. All joints flush”

“Plate f to run from door to door in one piece”

Signature/Initials: “Continental Works, Green Point. T. F. Rowland, Agt.”

Rendered: “Nov. 11th 1861”

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is similar to Catalog Drawing 52. The signature and date indicate that it was made in the Continental Iron Works during the construction of the *Monitor*.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 56

Title: Main Bulkhead, Forward Side

Date of Subject:

November 11, 1861

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

19 3/4 inches by 26 3/4 inches

Size [Sight]:

15 inches by 25 inches

Inscribed:

Scale: 1 inch = 1 foot

Notes: Same as Catalog Drawing 55

Signature/Initials: "T.F. Rowland, Agt."

Rendered: November 11, 1861

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is a Continental Iron Works tracing of Catalog Drawing 55.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 57

Title: *Monitor Keel*

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

Thomas Fitch Rowland (1831-1907)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 5/8 inches by 7 5/8 inches

Size [Sight]:

1/2 inch by 1 1/8 inches

Inscribed:

Rendered: ca. October 1861

Original:

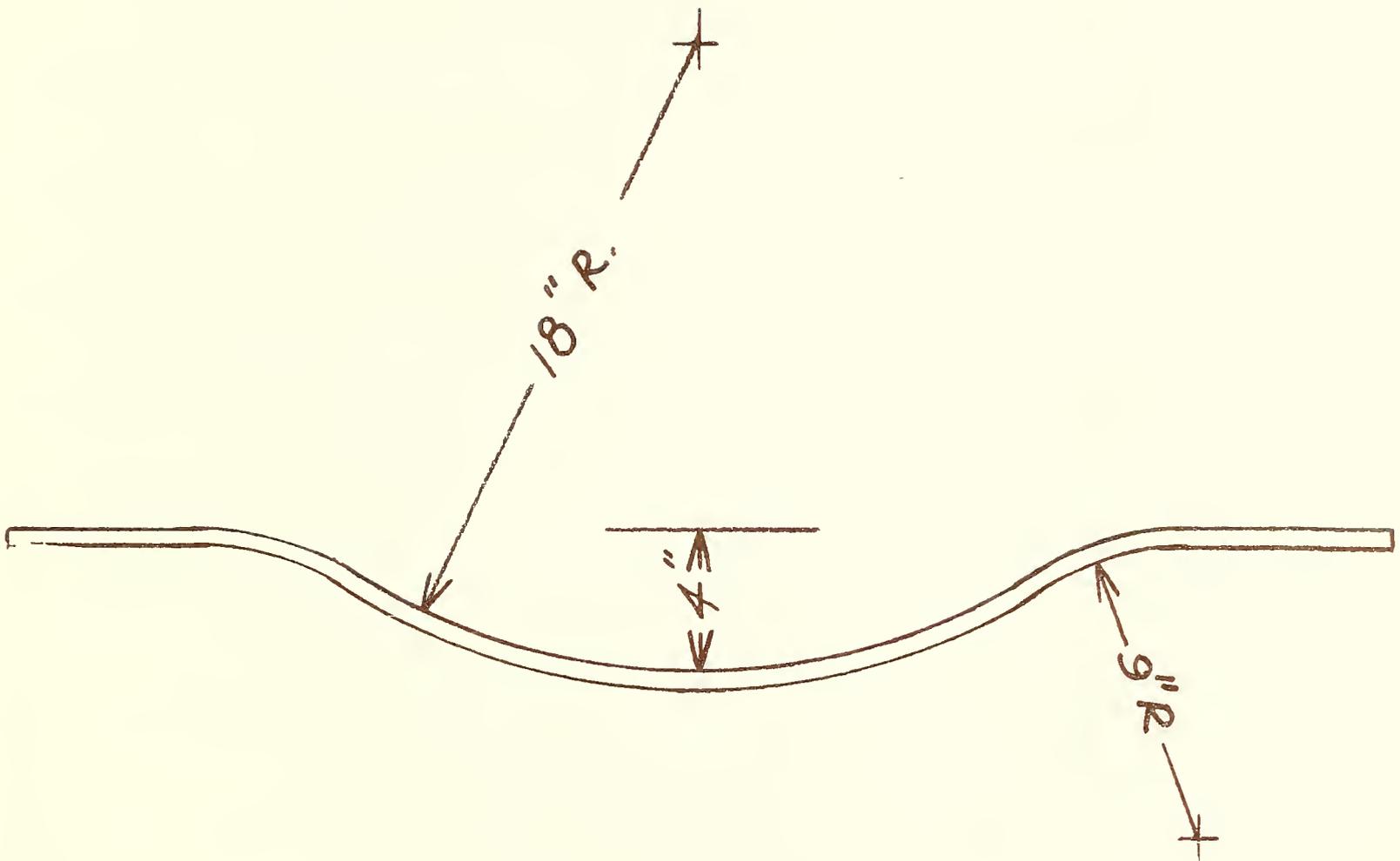
Location: Chester Griswold Collection
Archival Manuscripts
Smithsonian Institution

Identification: Accession No. 90398, Cata. No. 35341(1), Item 18.

Condition: Excellent

Remarks:

A small sketch is included in Thomas F. Rowland's letter to John A. Winslow on October 12, 1862 describing the shape of the bottom plates to form the keel of the *Monitor*. The 4-inch depth of the keel forms a fore and aft water limber for the bilge, an important function in the *Monitor* inasmuch as she had no bilge pumps forward.



57. Monitor Keel [Transcribed by author from original] (Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 58

Title: "FLOORING AND FLOOR TIMBERS OF THE ERICSSON BATTERY/SHOWING THE SYSTEM ADOPTED FOR VENTILATING THE FORWARD PART OF THE VESSEL"

Date of Subject:

October 18, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and black, blue, brown, and red ink on white buff paper.

Size [Sheet]:

8 1/2 inches by 20 1/2 inches

Size [Sight]:

5 inches by 18 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = 1 Foot"

Notes:

"Received with letter from J. Ericsson dated 19th Oct. 1861"

"Air conductor from Blower"

"Air Holes"

"Register"

Rendered: Before October 18, 1861

Original:

Location: National Archives

Identification:

Record Group 71, Records of the Bureau of Yards and Docks, Entry 5, Ltrs. Recd., Misc. Correspondence, Marked Pages, E 76, Ericsson to Smith, 18 October 1861, Encl., Recd., 19 Oct. 1861.

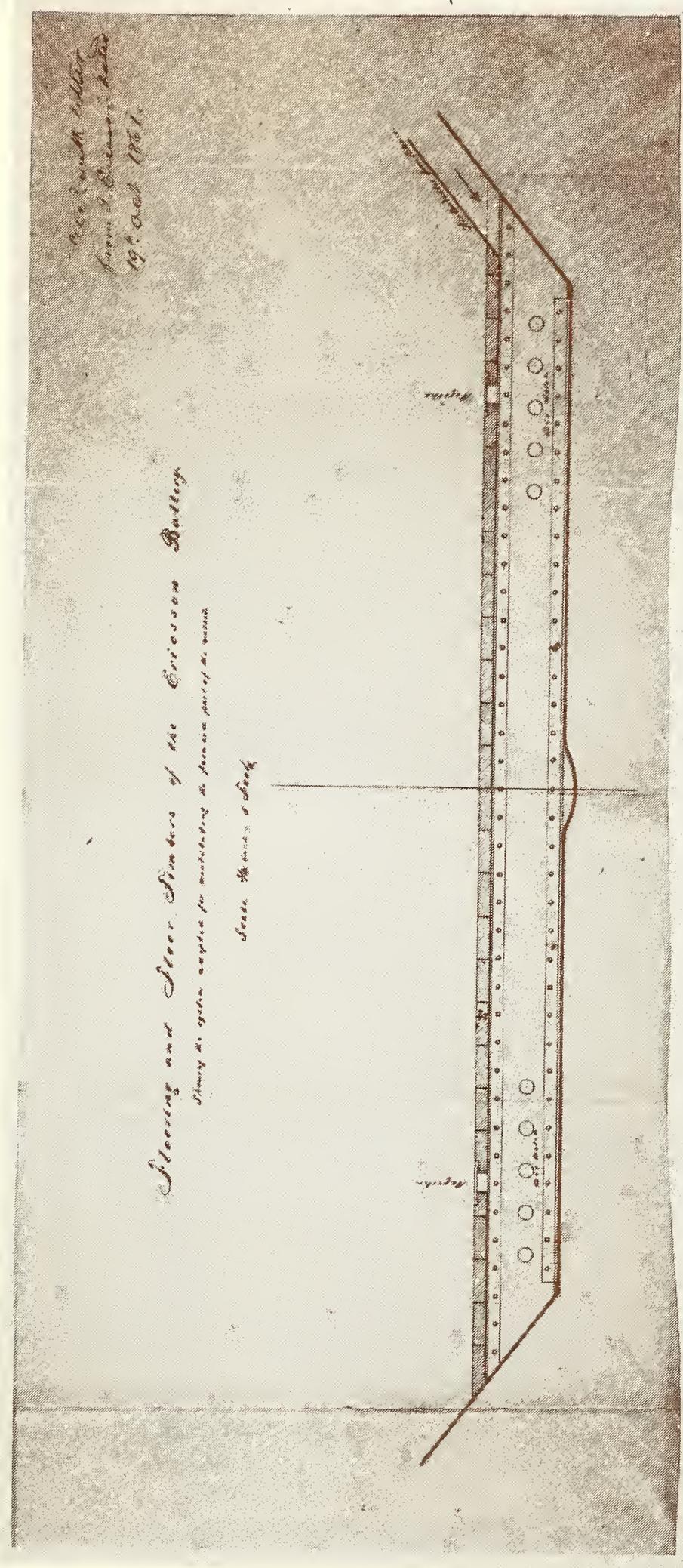
Remarks:

This drawing discloses the scheme for "ventilating the forward part of the vessel" and indicates the 3-inch-diameter "air holes" in the floor timbers, which can be observed in the wreck of the *Monitor*; floor registers for berth deck and wardroom ventilation; and the direction of air flow from the blower, between the ceiling and the shell plating of the sloping sides of the hull. The drawing also indicates the decking on the floor timbers as planking 2 1/2 inches by approximately 9 inches wide with 9-inch-diameter air registers

fed by 3 1/2-inch-diameter openings from the bilge. Similar registers on the U.S.S. *Tecumseh* were round, brass, and had an adjustable butterfly vane to control the flow of air.

This drawing indicates that all or part of the output of one of the engine room blowers must have been duct through the coal bunker into the bilge of the forward part of the vessel somewhere just forward of the main transverse bulkhead.

If the transverse section of this drawing is accurate, the view represents the appearance of a 15-inch floor timber forward of the main bulkhead looking forward, as all the floor timber forward of the blowers have angle iron riveted to the bottom on the after side, except frame 20, which is doubled. This would mean that the "air conductor" between the shell plating and the ceiling must have been connected to the starboard blower.



58. "FLOORING AND FLOOR TIMBERS OF THE ERICSSON BATTERY/SHOWING THE SYSTEM ADOPTED FOR VENTILATING THE FORWARD PART OF THE VESSEL" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 59

Title: Transverse and Longitudinal Sections of Hull Diagonal Bracing, Deck Stanchions, and Coal Bunker Bunkheads

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

13 5/8 inches by 32 1/4 inches

Size [Sight]:

9 inches by 30 1/8 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = one foot"

Signature/Initials: "J. Ericsson"

Rendered: "Oct. 7th - 1861"

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the floor timbers, angle irons, deck beam rest, hull plate straps, and coal bunker bulkheads. The coal bunker bulkheads [CB] were constructed from 28 flanged plates 3/16-inch by 36 inches by 111 inches¹

Footnote:

¹ Thomas Fitch Rowland to Corning-Winslow, November 21, 1861, Cf. Griswold Collection, Smithsonian Institution, Cata. #35341(1), Item #66.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 60

Title: Transverse and Longitudinal Sections of Hull Diagonal Bracing, Deck Stanchions, and Coal Bunker Bulkheads

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

12 1/2 inches by 32 5/8 inches

Size [Sight]:

9 inches by 30 1/8 inches

Inscribed:

Scale: "3/4 ins. = one foot"

Signature/Initials: "J. Ericsson"

Rendered: "Oct. 7th 1861"

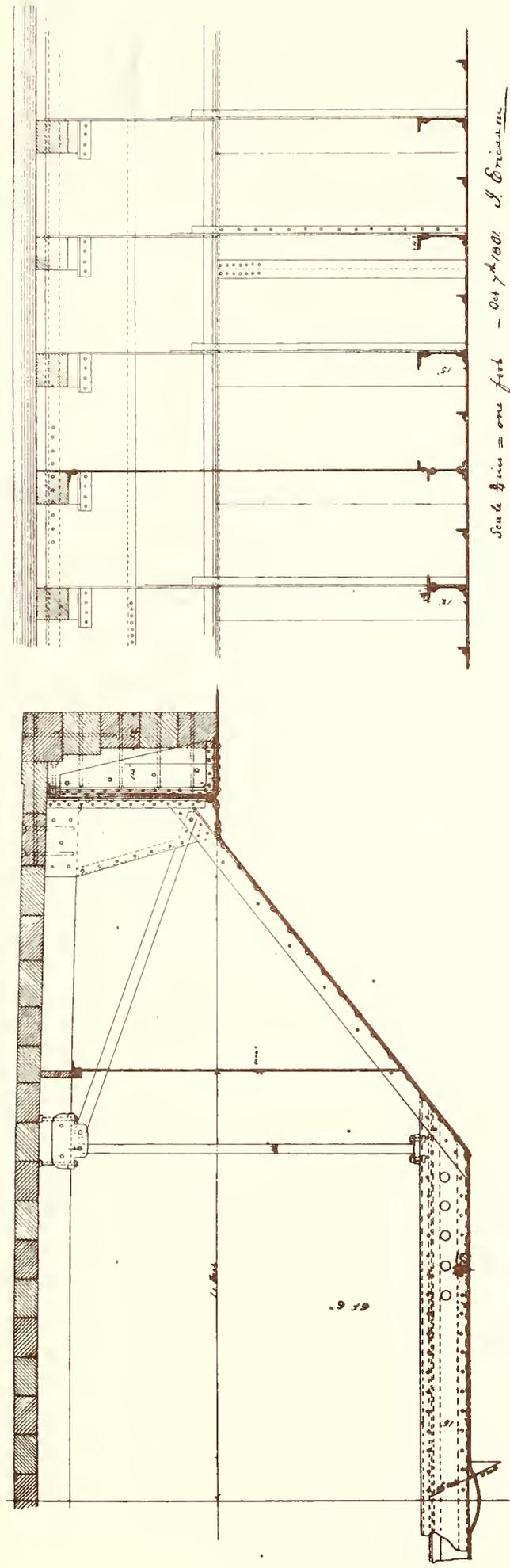
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 59.



60. Transverse and Longitudinal Sections of Hull Diagonal Bracing, Deck Stanchions, and Coal Bunker Bulkheads (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 61

Title: "DECK BEAM BRACKETS, STANCHIONS AND DIAGONAL BRACES"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, red, and orange ink on tracing cloth.

Size [Sheet]:

22 3/8 inches by 31 3/4 inches

Size [Sight]:

21 inches by 29 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "Full Size"

Notes: "70 Brackets"

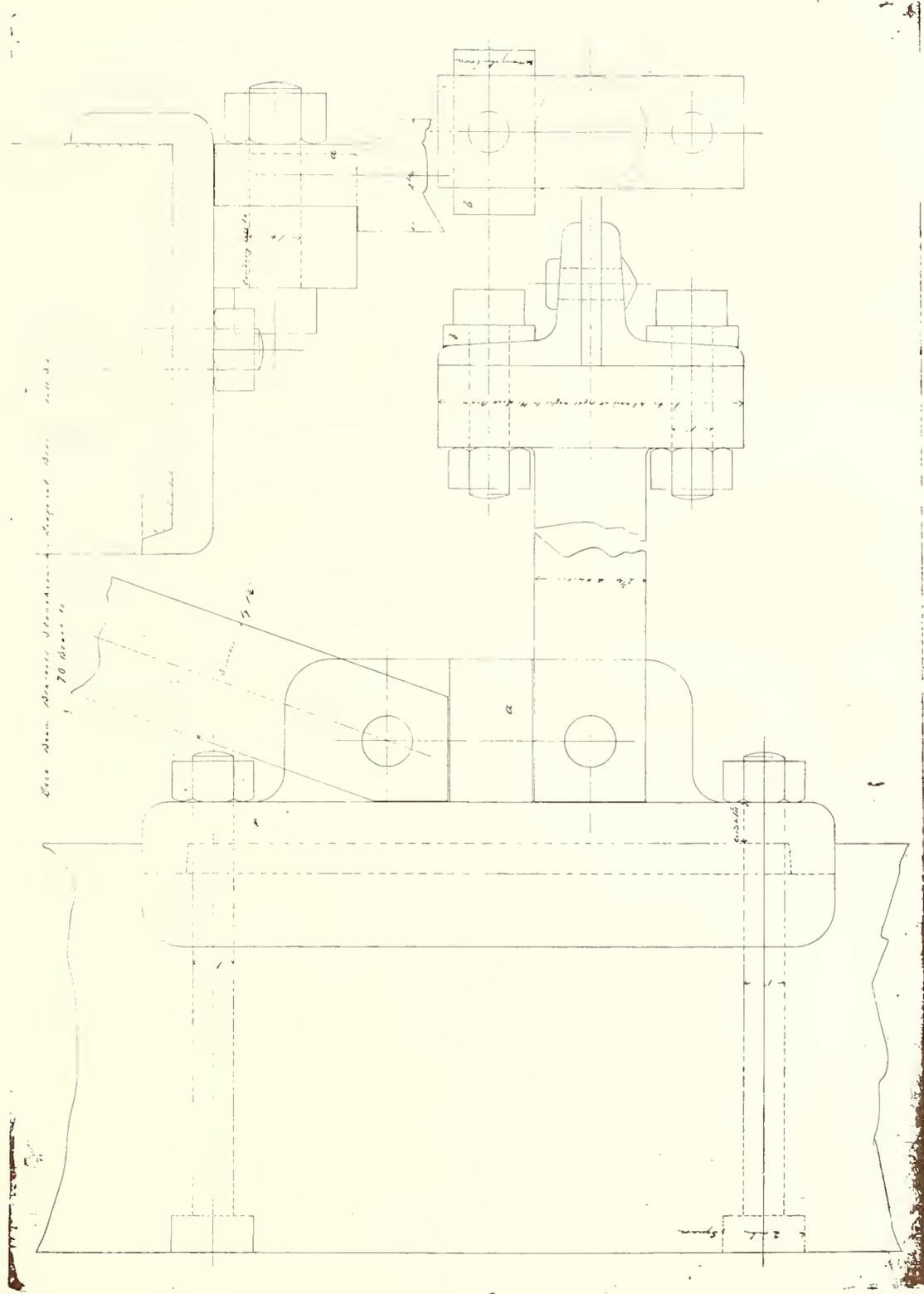
Rendered: ca. October 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Remarks:

This drawing requires seventy deck beam brackets and stanchions to be used throughout the ship to support the 10-inch deck beams.



61. "DECK BEAM BRACKETS, STANCHIONS, AND DIAGONAL BRACES."
 (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 62

Title: "DECK BEAM BRACKETS AND STANCHIONS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

22 3/8 inches by 30 1/2 inches (est.)

Size [Sight]:

21 1/2 inches by 29 inches (est.)

Inscribed:

Title Block/Caption:

"Deck Beam Brackets, (and) [added by J.E.] Stanchions (& diagonal braces: Full size, Oct. 14th 1861) [deleted by J.E.]"

Scale: "Full size"

Notes:

"70 Brackets" [deleted by J.E.]
See "Remarks"

Signature/Initials: "Made by Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: October 14, 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 17(132)

Condition: Good

Remarks:

Two designs of the deck beam stanchion brackets are represented in this drawing. One to accommodate a 12-inch deck beam and the other the regular 10-inch-by-10-inch beams. Three 12-inch deck beams are used in the forward part of the ship; under the pilothouse and just aft of the anchor well. The stanchions are indicated as 2 3/4 inches in diameter.



62. "DECK BEAM BRACKETS AND STANCHIONS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 63

Title: Bulwark Bracket Riveting Diagram

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

16 1/2 inches by 25 inches

Size [Sight]:

16 inches by 22 3/4 inches

Inscribed:

Scale: "3 ins. = one foot"

Signature/Initials: "J. Ericsson"

Rendered: "Oct 7th 1861"

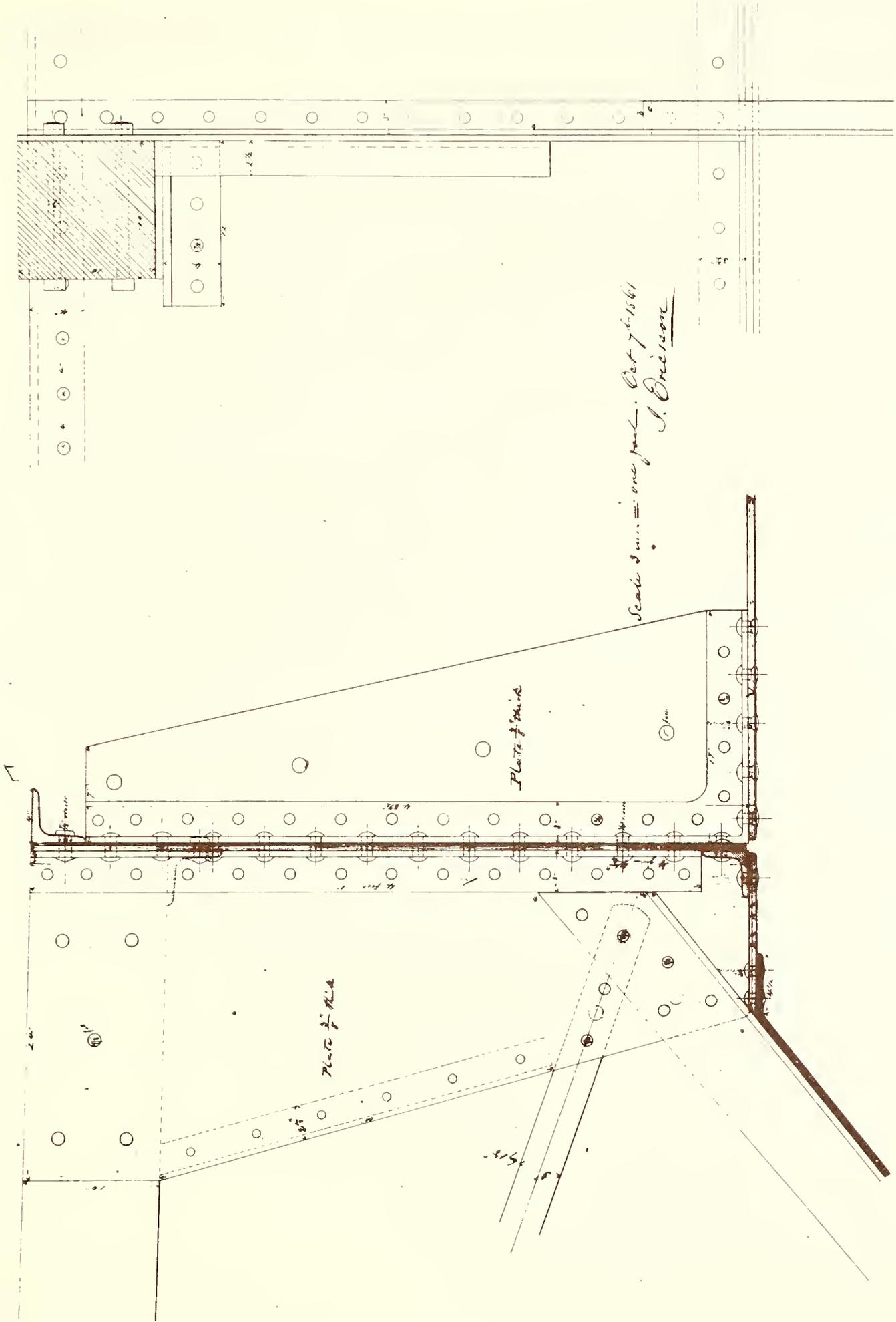
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the location of the rivets fastening the deck beam bracket to the side angle iron and the inner stiffening angle iron; the deck beam rests; the construction of the armor shelf brackets; and the riveting of the upper and lower longitudinal angle irons of the side bulwark.



Scale 3/4" = one foot. Oct 7th 1861
 J. Ericsson

63. Bulwark Bracket Riveting Diagram (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 64

Title: Bulwark Bracket Riveting Diagram

Date of Subject:

October 7, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

19 1/4 inches by 25 1/2 inches

Size [Sight]:

16 inches by 23 1/4 inches

Inscribed:

Scale: "3 ins. = one foot"

Signature/Initials: "J. Ericsson"

Rendered: "Oct 7th 1861"

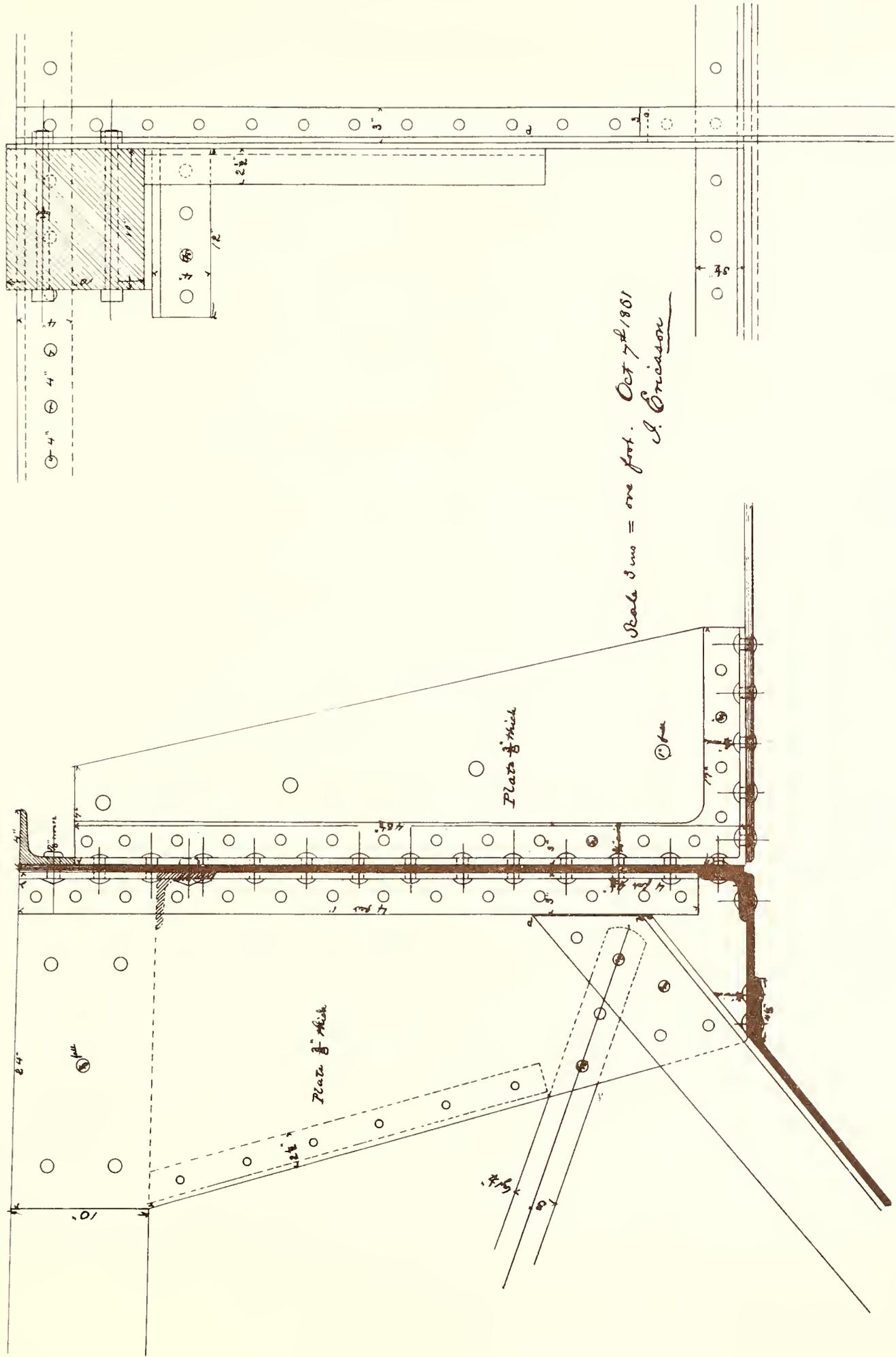
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 63.



64. Bulwark Bracket Riveting Diagram (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 65

Title: "SIDE ARMOR OF THE ERICSSON BATTERY"

Date of Subject:

October 19, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and black and blue ink on white buff paper.

Size [Sheet]:

8 5/8 inches by 8 7/8 inches (est.)

Size [Sight]:

7 1/2 inches by 4 1/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = one foot"

Notes:

"Recd. with letter from J. Ericsson dated 19 Oct."

"File with letter recd. 21 Oct/61"

"Original Armor Plate/Amended Armor Plate/Waterline"

Rendered: Before October 19, 1861

Original:

Location: National Archives

Identification:

Record Group 71, Records of the Bureau of Yards and Docks. Entry 5, Ltrs. Recd., Misc. Correspondents, Mkd. Pgs., E76d, Ericsson to Smith, 19 October 1861, Encl., Recd. 21 October 1861.

Condition: Good

Remarks:

This drawing represents the approved modification of the *Monitor's* side armor, changing from six 1-inch plates 5 feet high to five 1-inch plates with decreasing heights:

Course #1 - 5 feet

Course #2 - 5 feet

Course #3 - 5 feet

Course #4 - 3 feet

Course #5 - 2 feet 6 inches

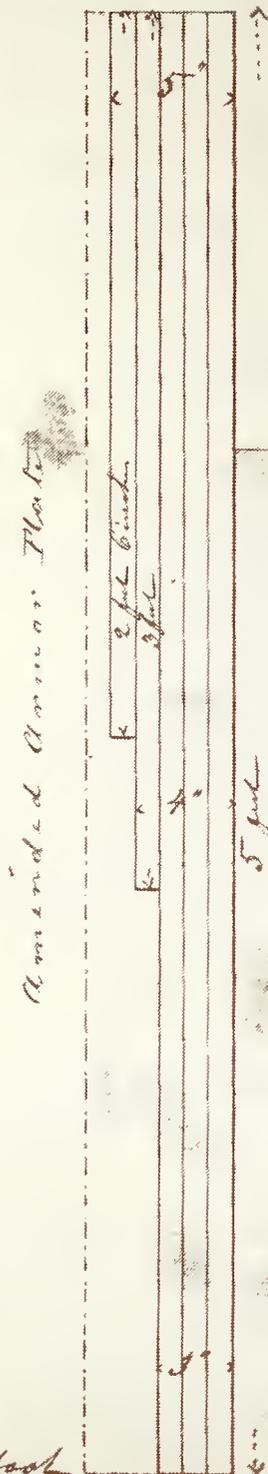
Side armor of the Ericsson Battery



Original armor Plate

5 feet

6'



Amended armor Plate

5 feet

2 feet thick
3 feet

Water Line

Scale 1/2 in. = one foot

File with letter need 20' cast for

see with letter from
J. Ericsson dated 23 Oct

65. "SIDE ARMOR OF THE ERICSSON BATTERY" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 66

Title: "ERICSSON BATTERY. BULWARK"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and orange ink on tracing cloth.

Size [Sheet]:

11 1/2 inches by 15 1/2 inches

Size [Sight]:

7 1/2 inches by 8 7/8 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Rendered: ca. October 1861 (est.)

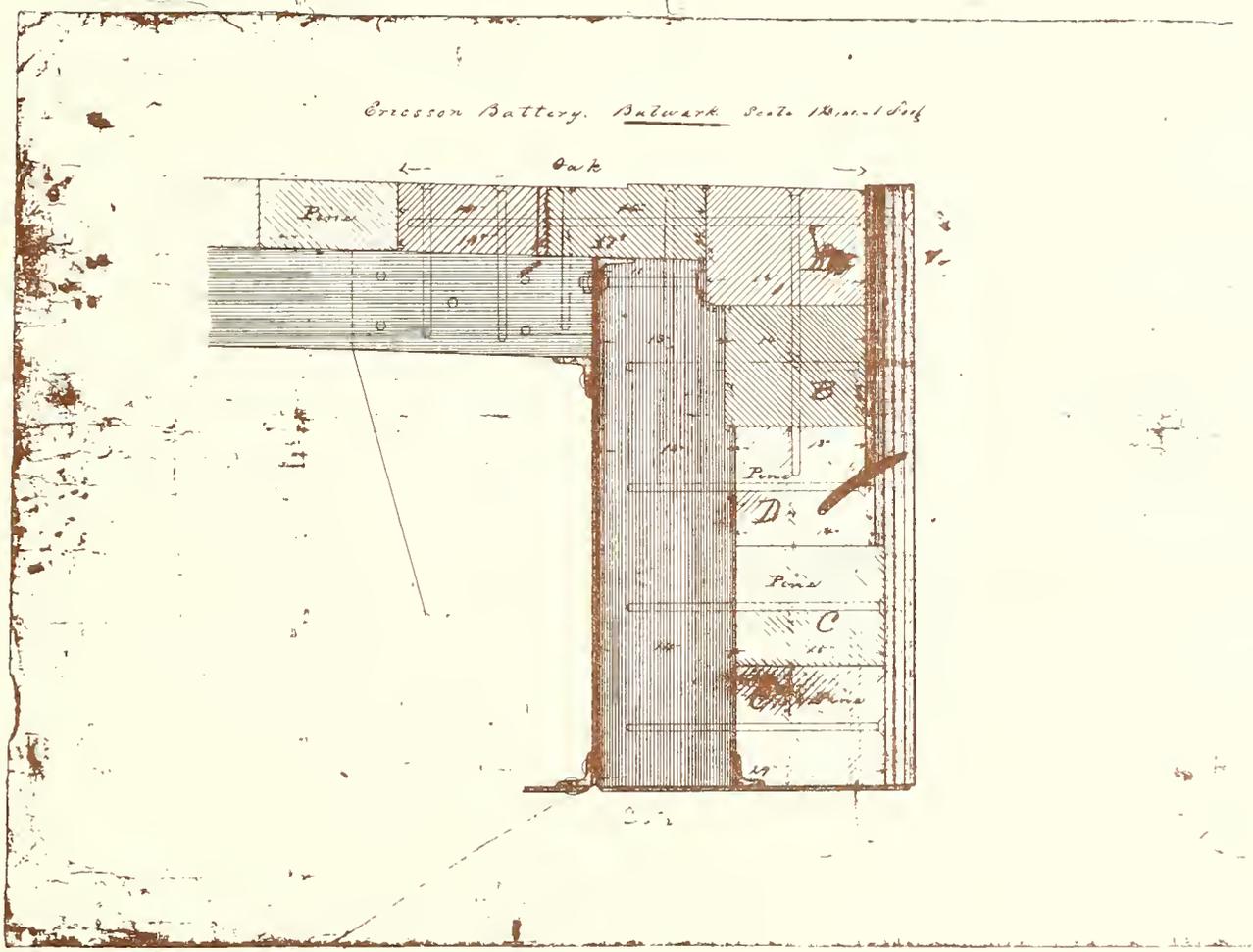
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Dirty and stained

Remarks:

The drawing shows details and composition of the deck and side armor backing and attachment. The inner course of oak backing is bolted at the top to the side bulwark and the outer pine course is spiked to the oak. The three sheer planks of the deck are oak and the inner planks pine. In this arrangement the edge of the upper course of the deck armor was to be flush with the top of the side and the lower course rabbeted into the deck in the second sheer plank.



66. "ERICSSON BATTERY. BULWARK." (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 67

Title: "ERICSSON BATTERY. BULWARK"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and orange ink on tracing cloth.

Size [Sheet]:

12 inches by 15 7/8 inches

Size [Sight]:

7 1/2 inches by 9 inches

Inscribed:

Title Block/Caption: See title.

Rendered: ca. October 1861 (est.)

Original:

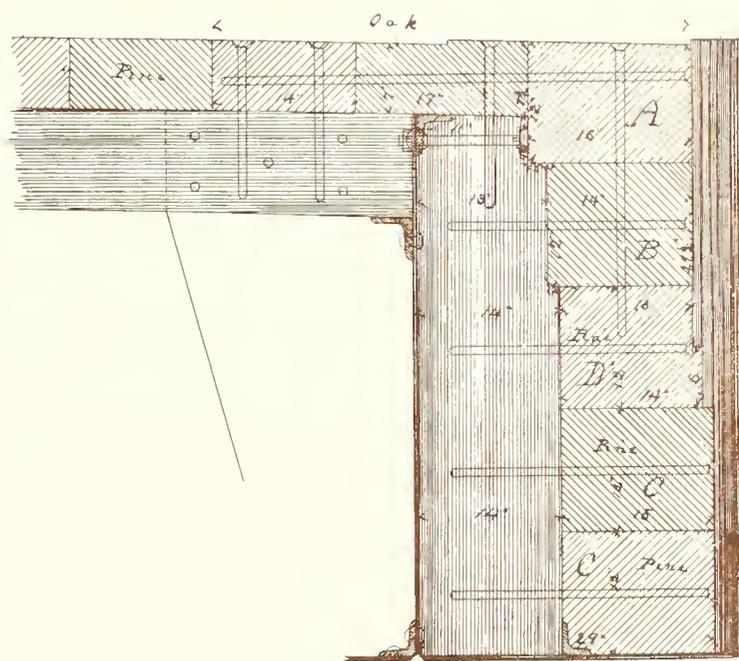
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 66.

Ericsson Battery Bulwark Scale 1/2 in. = 1 foot



67. "ERICSSON BATTERY. BULWARK" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 68

Title: "ERICSSON BATTERY/TRANSVERSE SECTION OF BULWARK AND ARMOR."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, yellow, brown, red, and blue ink and pencil on paper.

Size [Sheet]:

10 inches by 24 3/8 inches

Size [Sight]:

9 1/4 inches by 9 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Notes:

"Remark: The deep color indicates oak wood
" light " " pine do."

Signature/Initials: "Monitor/C.W.M." [Pencil]

" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

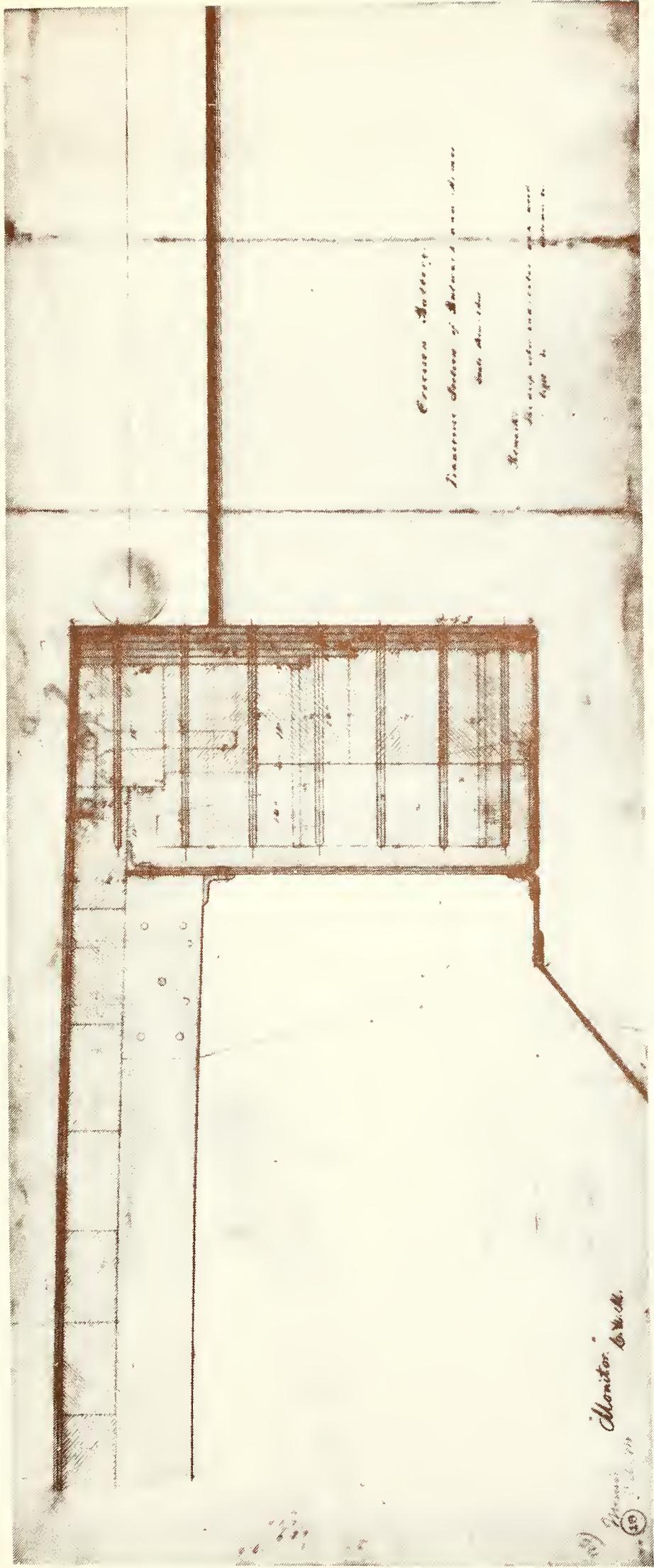
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 19(120)

Condition: Excellent

Remarks:

This drawing shows the details of the revision of the side armor. Both courses of the deck armor have been extended to meet the outer plate of the side armor. A pencil sketch shows the arrangement of a "ring bolt" in the deck. These flush-mounted rings were featured on monitor-class vessels and can be seen in the photographs of the *Monitor*. There are probably four on each side.



68. "ERICSSON BATTERY/TRANSVERSE SECTION OF BULWARK AND ARMOR"
 (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 69

Title: "BATTERY. BULWARKS AND SIDE ARMOR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, brown and yellow ink with pencil on paper.

Size [Sheet]:

17 1/2 inches by 25 1/2 inches (est.)

Size [Sight]:

13 1/2 inches by 22 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot" [Transverse Section Elevation]
"3/4 ins. = 1 Foot" [Longitudinal Section Plan]

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor'/C.W.M.' [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 4(103)

Condition: Excellent

Publication:

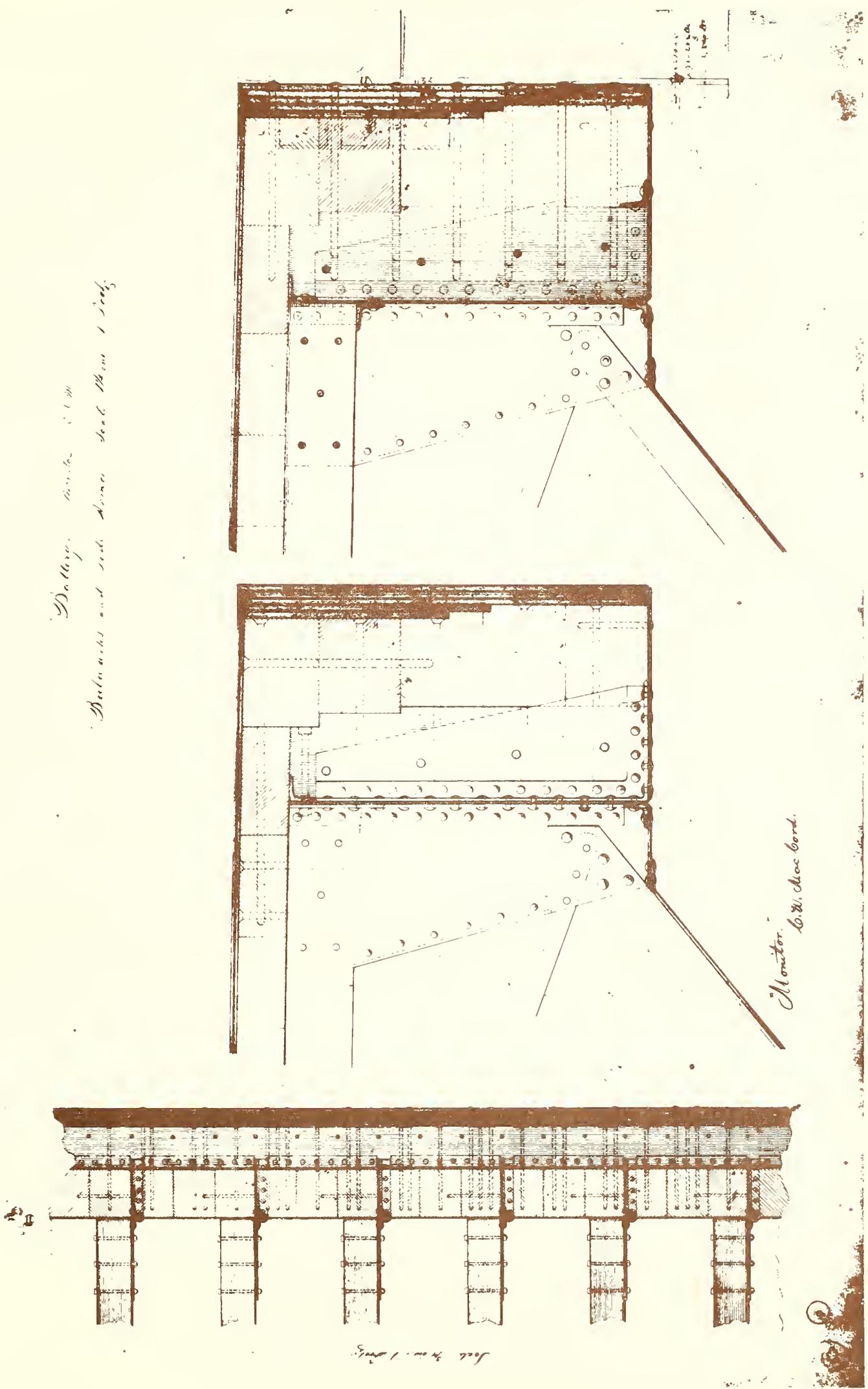
Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 28.

Remarks:

This drawing shows three views of the construction of the side armor and backing, from l. - r.: (1) A plan view of a longitudinal section of the port side bulwark; the transverse spiking of the wood backing behind the inner armor plate; the longitudinal spiking of the inner course of wood backing; the top, vertical spiking of the outer course of wood backing; and the side bracket bolting; (2) An elevation of a transverse section of the port side

bulwark and armor looking aft, showing the riveting of the side bracket and the spiking and bolting of the wood backing and deck plating above the side brackets: And (3) an elevation of a transverse section of the starboard side bulwark looking forward, showing the spiking of the side armor to the wood backing.

The plan and both elevations show pencil sketches that may be modifications considered for the next *Passaic* class of monitor (i.e., a curved hull, an extension of the depth of the side armor to 6 feet, increased freeboard by 6 inches, and the inclusion of 7-inch-by-4-inch iron armor stringers imbedded in the wood backing directly behind the armor plating).



69. "BATTERY. BULWARKS AND SIDE ARMOR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 70

Title: Recommendation for an Angle Iron Deck Plate Guard

Date of Subject:

April 23, 1862

Draftsman/Life Dates:

Isaac Newton (1837-1884)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 1/2 inches by 7 1/2 inches (est.)

Size [Sight]:

1/2-inch by 1/2-inch (est.)

Inscribed:

Signature/Initials: "Isaac Newton"

Rendered: "April 23d 1862"

Original:

Location: John Ericsson Papers
American-Swedish Historical Foundation

Identification: Newton to Ericsson, 23 April 1862.

Publication:

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 5.

Remarks:

In this letter from the *Monitor's* engineering office, 1st Assistant Engineer Isaac Newton, U.S.N., to Ericsson, Newton recommends that a "Heavy angle iron be fitted (with a sharp outer corner) to keep the deck plates from rolling up as they did in the *Monitor*, exposing the wood — Thus. viz. drawing". The significance of this drawing is that the side armor plates are shown with the outer plates projecting up to the level of the top of the deck with the deck plates butted behind its inner side. This is in agreement with Catalog Drawings 41, 68 and 69 made by MacCord.

by hand



large

by the

70. Recommendation for an Angle Iron Deck Plate Guard (American-Swedish Historical Foundation)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 71

Title: "BULWARK & ARMOR AT BOW AND STERN"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

19 1/2 inches by 25 1/2 inches (est.)

Size [Sight]:

18 1/2 inches by 24 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 inch = one foot"

Signature/Initials: "Monitor/Capt. E" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. November 1861 (est.)

Original:

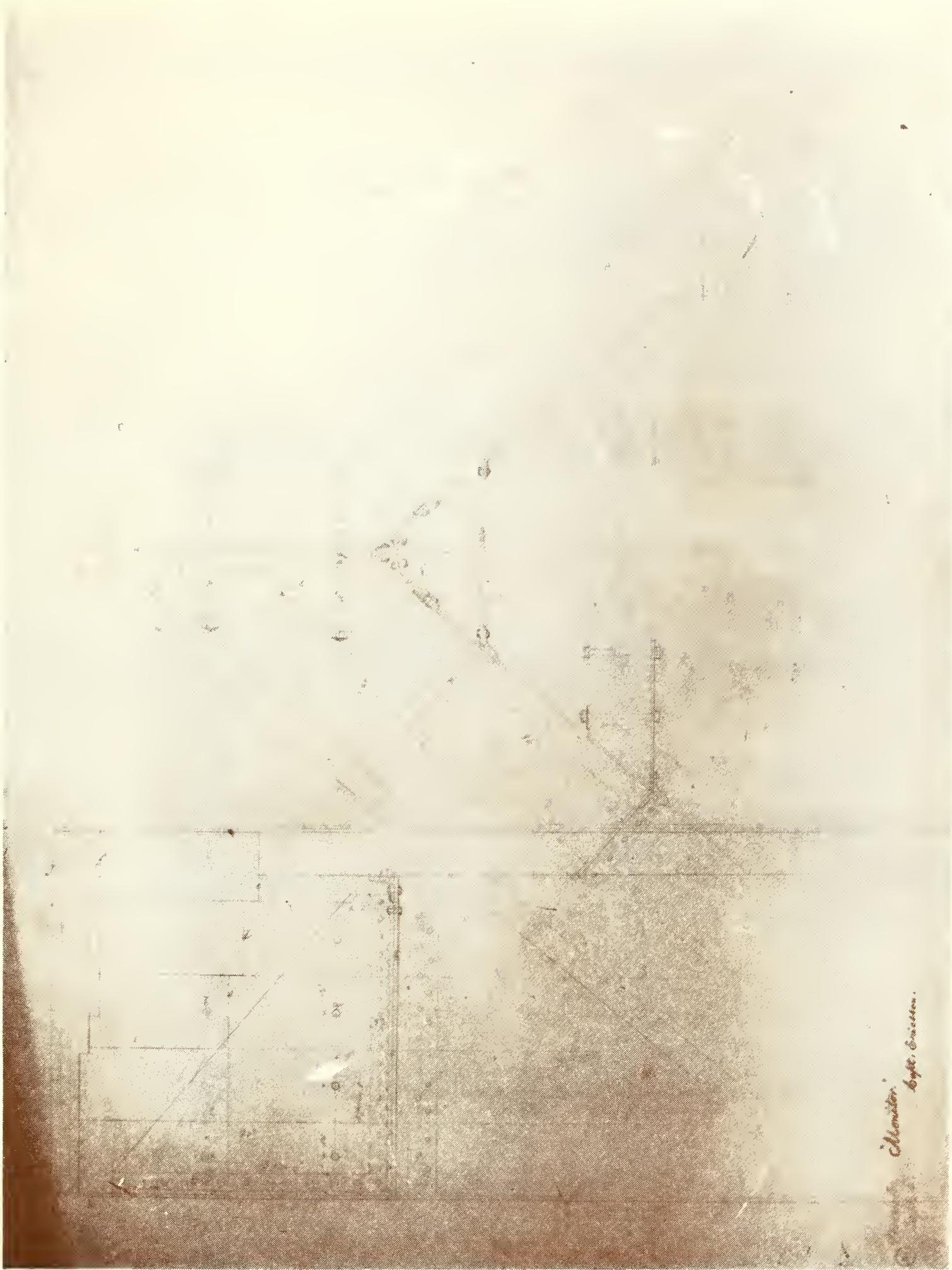
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 31(124)

Condition: Good

Remarks:

The drawing shows the construction of the bow and stern above the level of the armor shelf. A 3/8-inch bulkhead is indicated just forward of the first deck beam. The wood backing at the prow is joined by nine 1 1/4-inch-diameter bolts, six of which pierce the centerline and the longitudinal triangular armor shelf bracket. The stem piece joining the side bulwarks is riveted to the sides with a lap joint as shown in Catalog Drawing 13 and 14. The deck armor is incorrectly shown as overlapping the side armor.



71. "BULWARK & ARMOR AT BOW AND STERN" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 72

Title: "ERICSSON BATTERY/BULWARKS AND ARMOR AT BOW AND STERN"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

16 1/4 inches by 23 inches

Size [Sight]:

13 1/2 inches by 21 3/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Rendered: ca. November 1861 (est.)

Original:

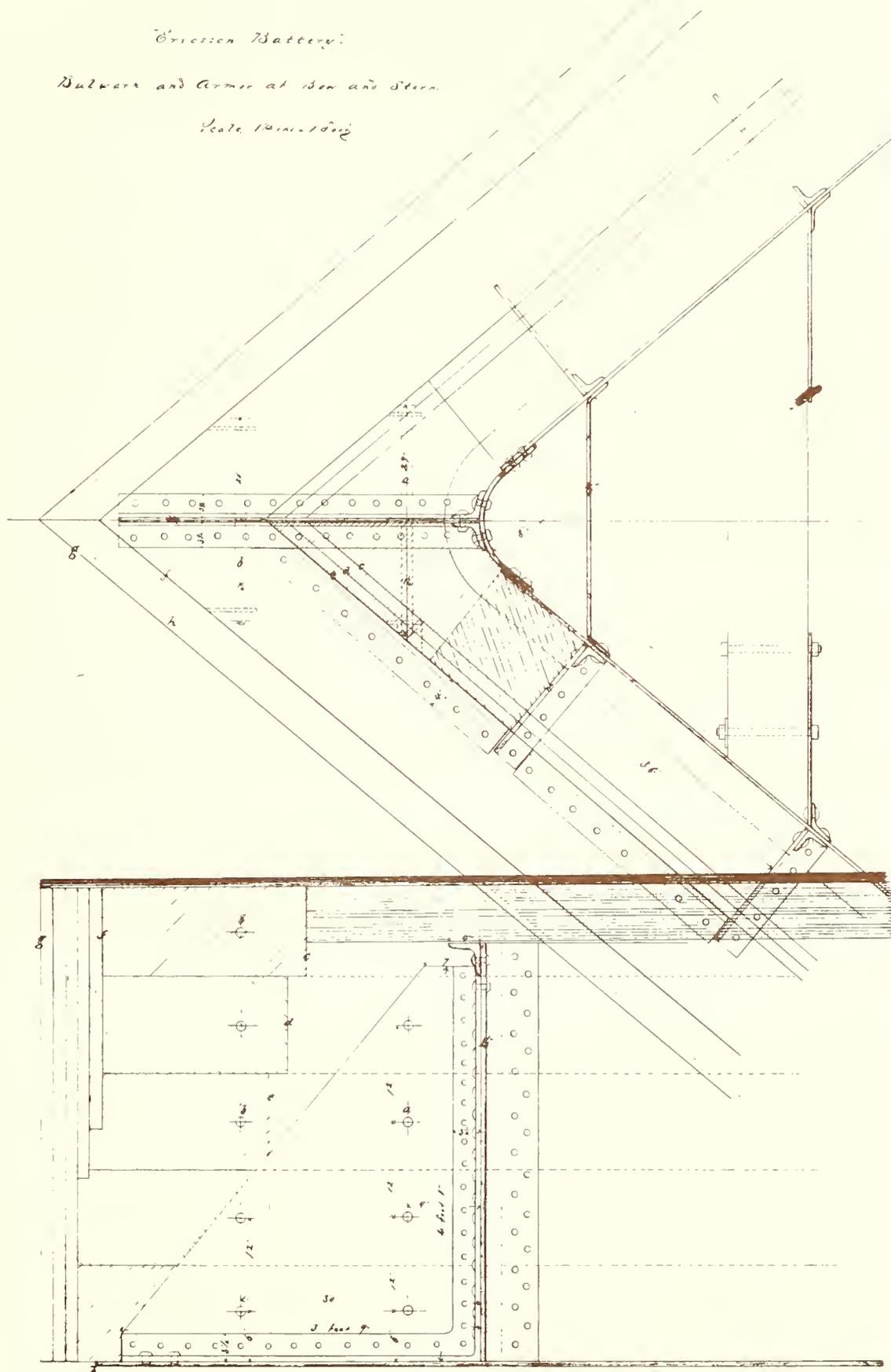
Location: Thomas F. Rowland, Jr. Collection

Condition: Several water stains

Remarks:

This drawing is similar to Catalog Drawing 71.

Ericsson Battery:
Bulwark and Armor at Bow and Stern.
Scale 1/4 in = 1 ft



72. "ERICSSON BATTERY/BULWARKS AND ARMOR AT BOW AND STERN"
(Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 73

Title: "ERICSSON BATTERY/BULWARKS AND ARMOR AT BOW AND STERN"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

17 1/4 inches by 24 1/2 inches

Size [Sight]:

14 inches by 22 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Rendered: ca. November 1861 (est.)

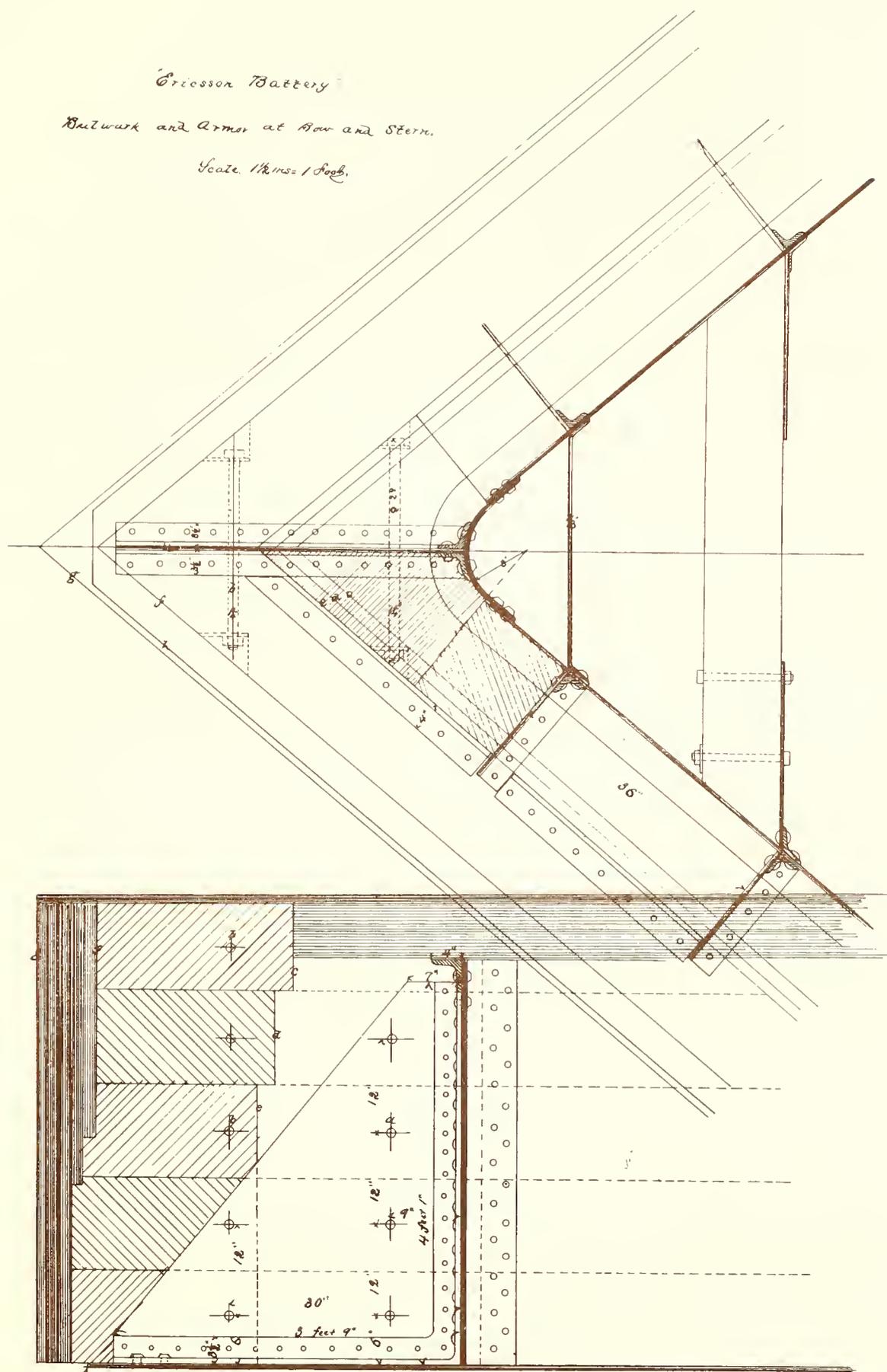
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 72.



73. "ERICSSON BATTERY/BULWARKS AND ARMOR AT BOW AND STERN"
 (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 74

Title: Bulwark and Armor Construction at Bow and Stern

Date of Subject:

December 3, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

14 3/4 inches by 18 inches

Size [Sight]:

13 7/8 inches by 15 1/2 inches

Inscribed:

Title Block/Caption: "Ericsson Battery"
"Continental Works"

Scale: "1 1/2 ins."

Signature/Initials: "T.F. Rowland Agt"

Rendered: "Decr. 3d 1861"

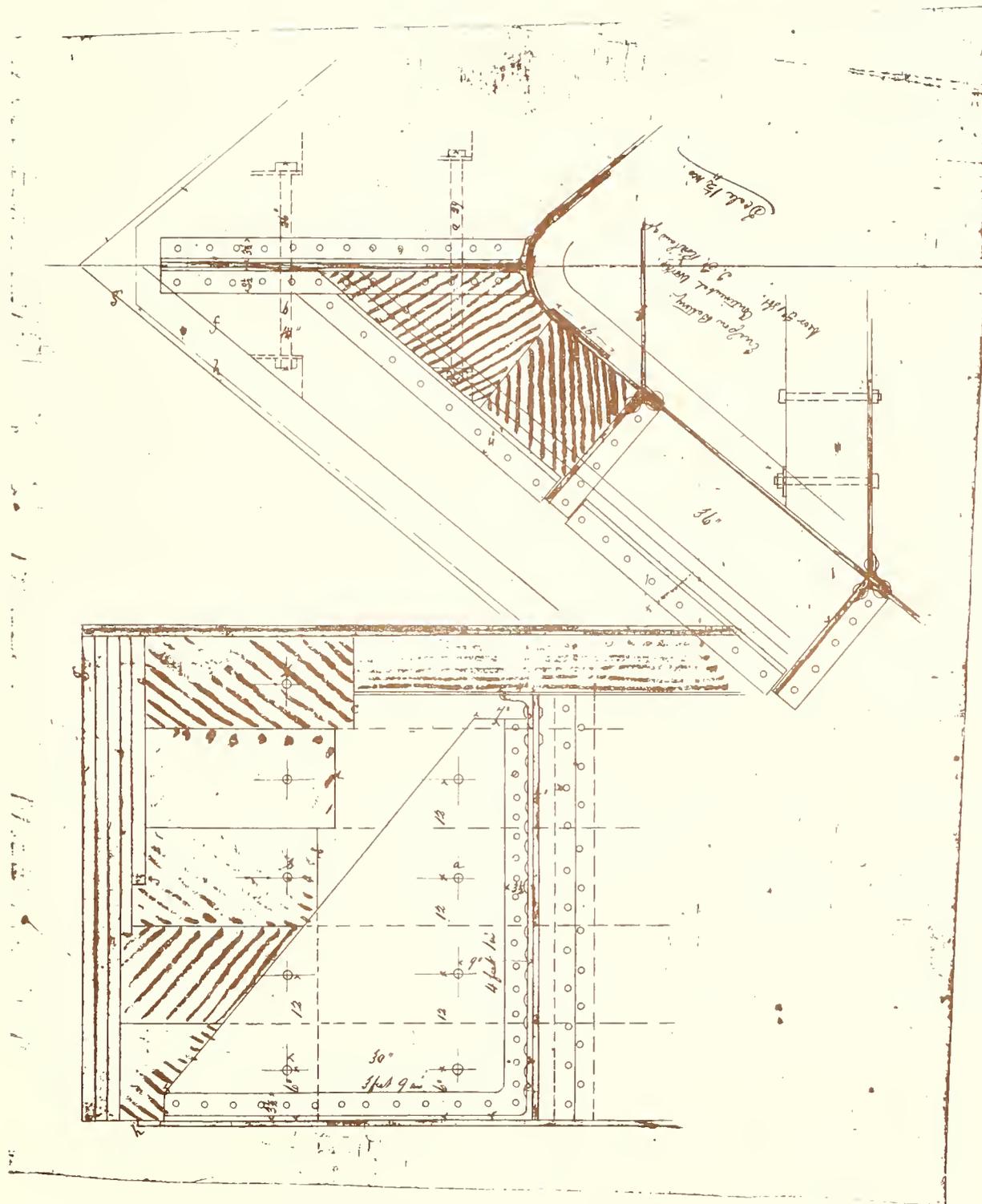
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Slight staining

Remarks:

The signature of T. F. Rowland on the drawing does not mean that he was the draftsman but may indicate either his approval or ownership of the drawing. This drawing is similar to Catalog Drawing 73, but shows the stem being joined to the sides of the bulwarks with butt straps, producing a flush joint. A predominant number of drawings in this catalog favor the lap joint of Catalog Drawing 71-73.



74. Bulwark and Armor Construction at Bow and Stern (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 75

Title: Bulwark and Armor Construction at Bow and Stern

Date of Subject:

December 3, 1861

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

15 1/2 inches by 18 1/2 inches

Size [Sight]:

13 inches by 16 1/2 inches

Inscribed:

Title Block/Caption: "ERICSSON BATTERY"

Scale: "1 1/2 ins."

Notes: "Ericsson Battery"
"Continental Works"

Signature/Initials: "T.F. Rowland Agt"

Rendered: "Decr. 3d 1861"

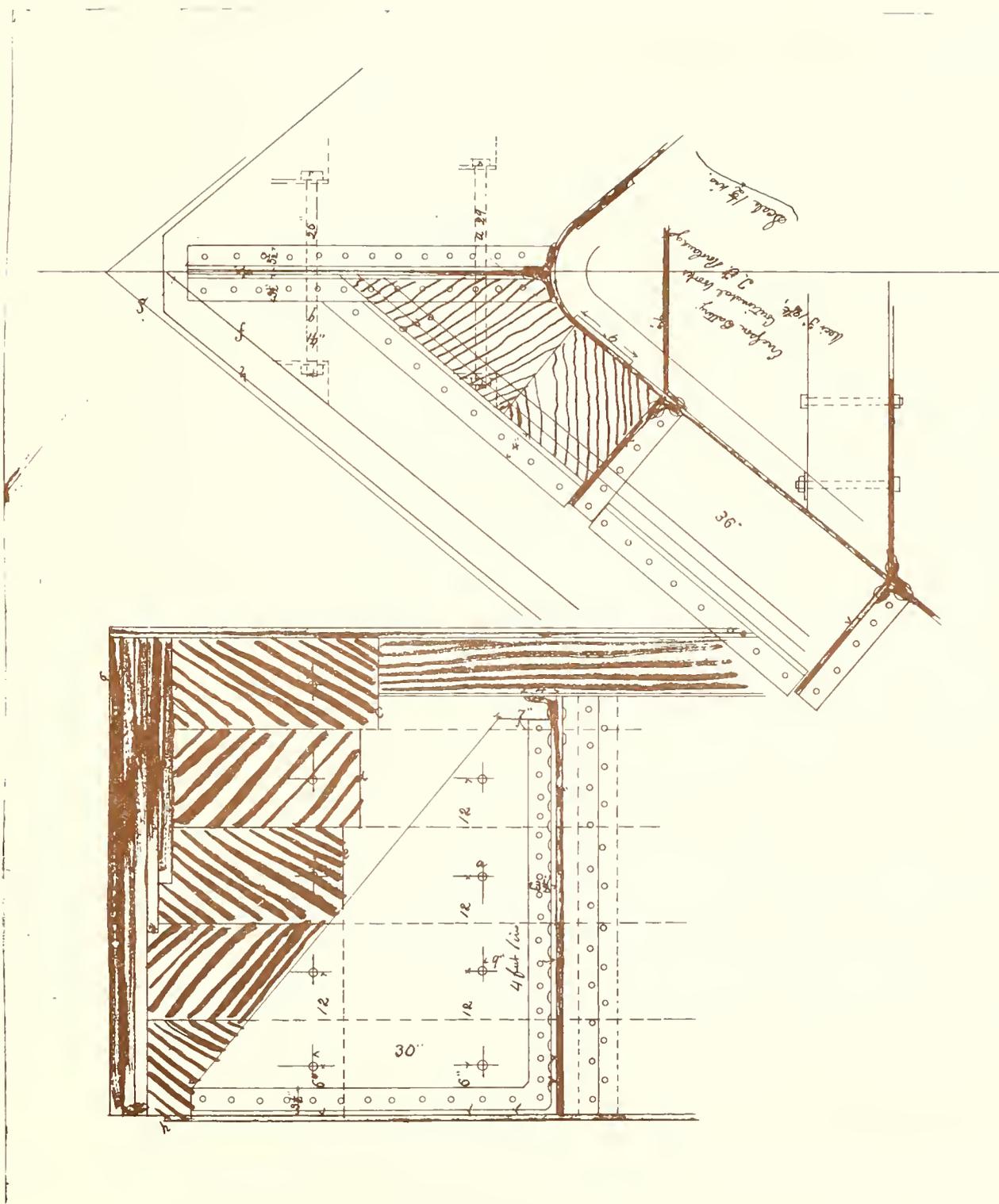
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 74.



75. Bulwark and Armor Construction at Bow and Stern (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 76

Title: Anchor Well and Boatswain's Lockers

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, red and orange ink on tracing cloth.

Size [Sheet]:

11 1/4 inches by 12 1/4 inches

Size [Sight]:

7 inches by 7 inches

Inscribed:

Title Block/Caption: "ERICSSON BATTERY"

Scale: Unspecified

Rendered: ca. December 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

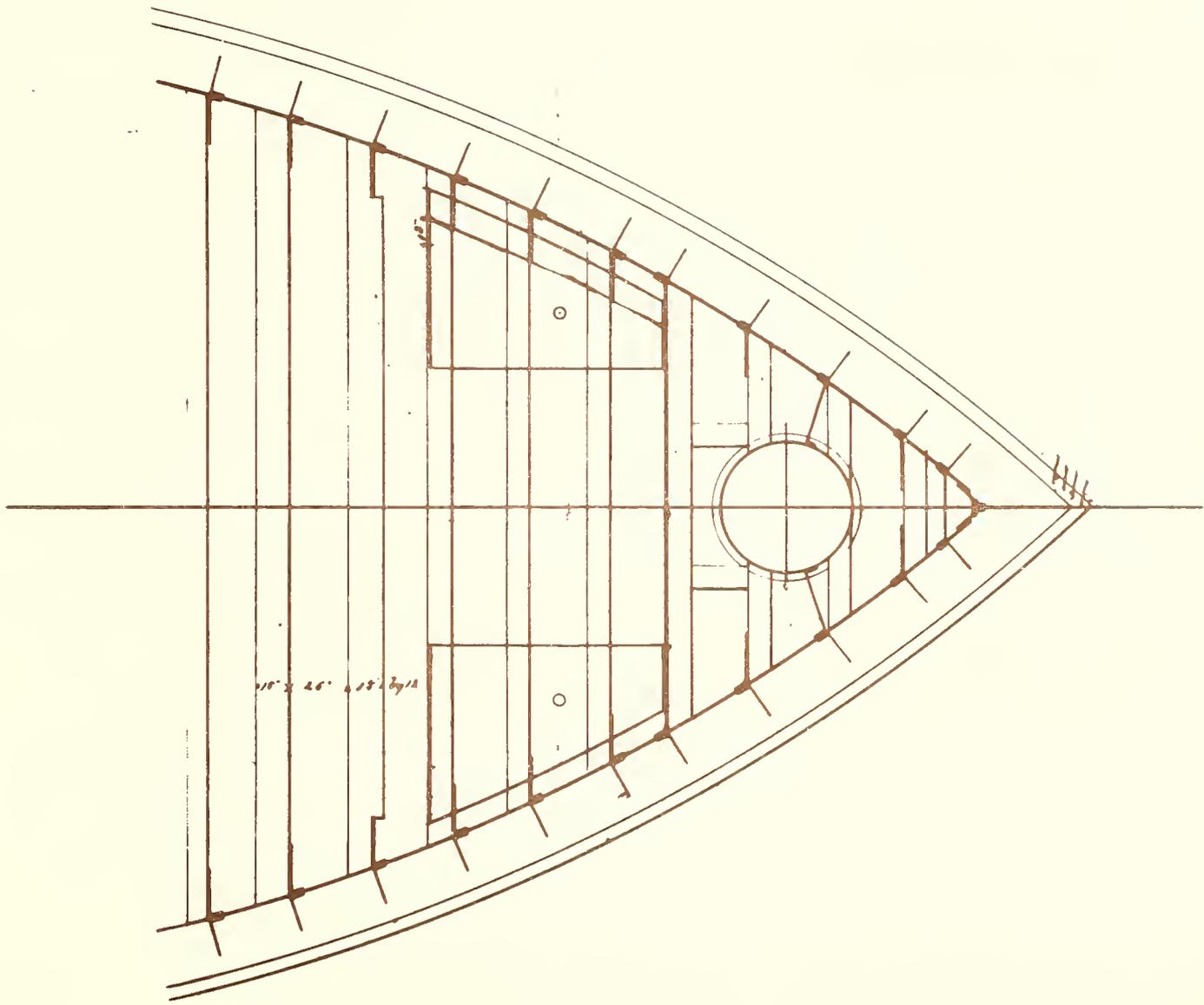
Remarks:

This drawing shows the construction of the iron web supporting the anchor well and indicates the location of bulkheads and deck lights that may represent the boatswain's lockers. The deck beams aft of the locker bulkhead are indicated as 15 inches by 12 inches; however the final plan show these heavy beams set forward one frame. The anchor well bulkhead [AW] is constructed from three plates, each 1/2 inch by 64 inches square.¹

Footnote:

¹T.F. Rowland to John Winslow, November 21, 1861. cf. Griswald Collection, Smithsonian, cata. #35341(1),. Item #66.

Ericsson Battery.



76. Anchor Well and Boatswain's Lockers (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 77

Title: "ENGINE BULKHEADS OF THE ERICSSON BATTERY"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

10 5/8 inches by 23 1/2 inches

Size [Sight]:

8 1/2 inches by 19 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = one foot"

Rendered: ca. November 1861 (est.)

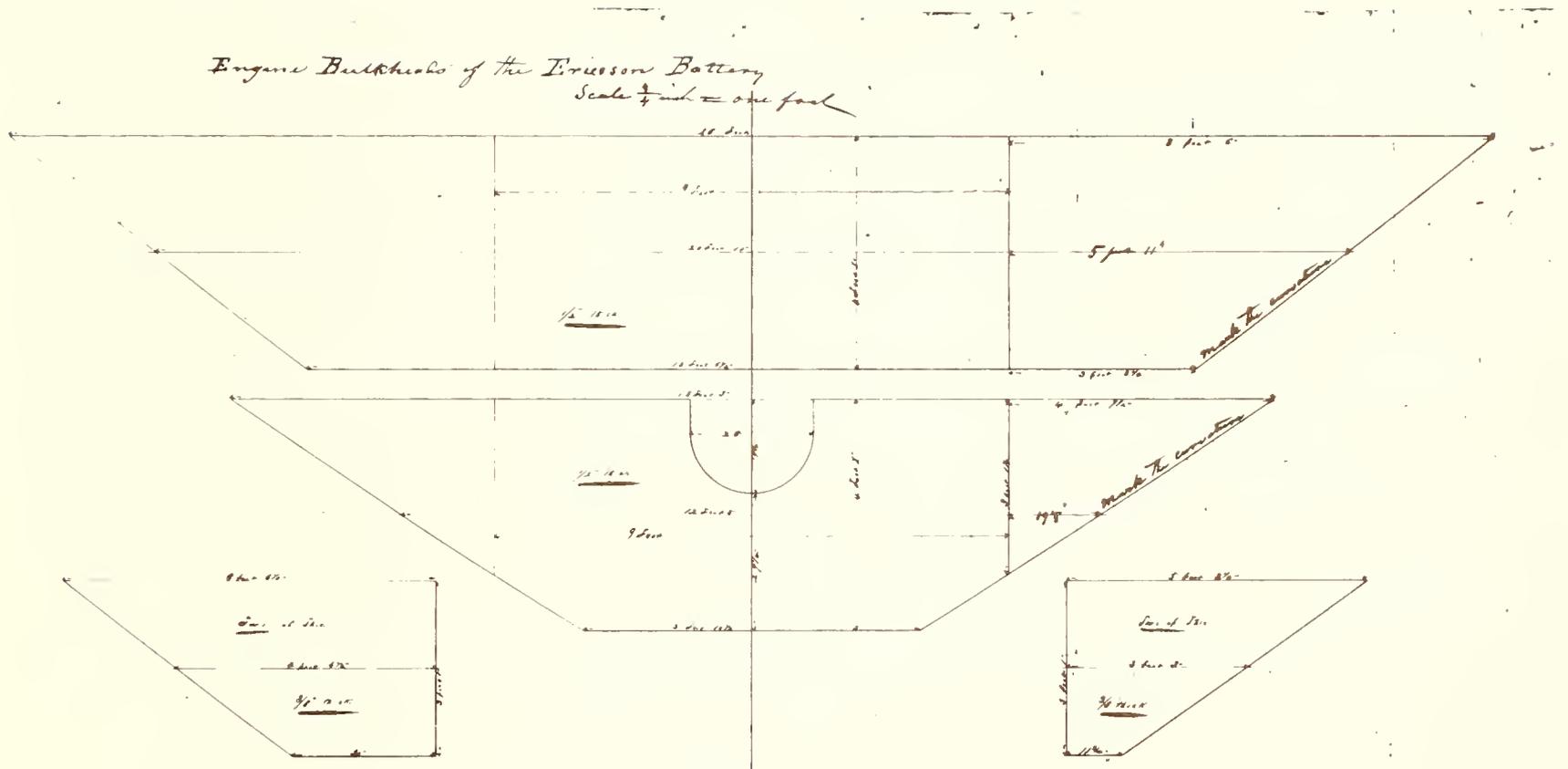
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the dimensions of the six transverse members of the main engine bulkhead. The top plate is located at frame 31, the center plate at frame 34, the lower left plate at frame 32, and the lower right plate at frame 33. The outboard ends of the plates carry the notations, "Mark the curvature." The horizontal center dimensions of each plate gives the ends of the sloping sides of the curvature necessary to match the hyperbolic curve of the hull at these sections.



77. "ENGINE BULKHEADS OF THE ERICSSON BATTERY" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 78

Title: "ENGINE BULKHEADS OF THE ERICSSON BATTERY"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

10 1/2 inches by 23 5/8 inches

Size [Sight]:

8 1/2 inches by 9 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = one foot"

Rendered: ca. November 1861 (est.)

Original:

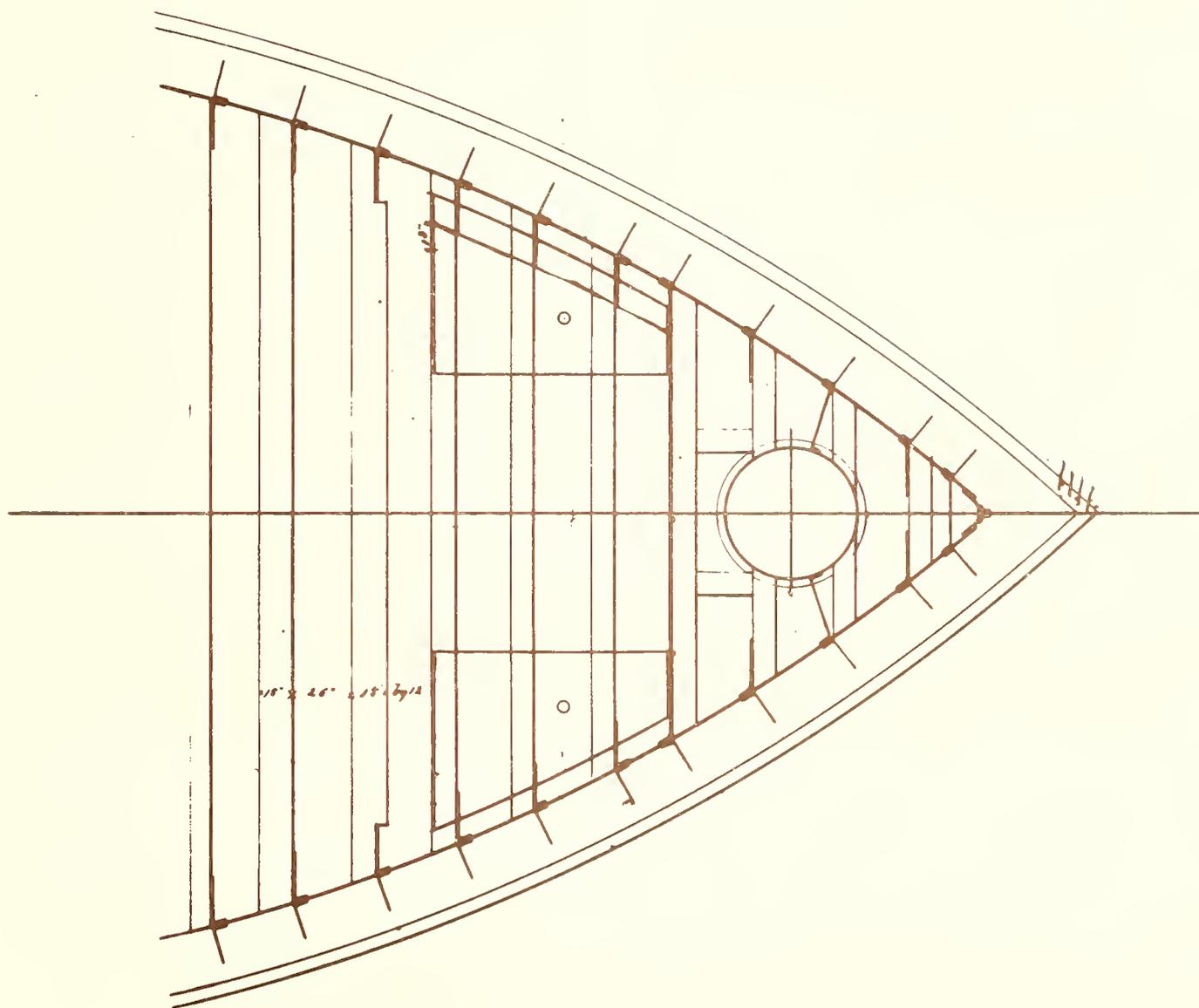
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 77.

Ericsson Battery.



76. Anchor Well and Boatswain's Lockers (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 77

Title: "ENGINE BULKHEADS OF THE ERICSSON BATTERY"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

10 5/8 inches by 23 1/2 inches

Size [Sight]:

8 1/2 inches by 19 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = one foot"

Rendered: ca. November 1861 (est.)

Original:

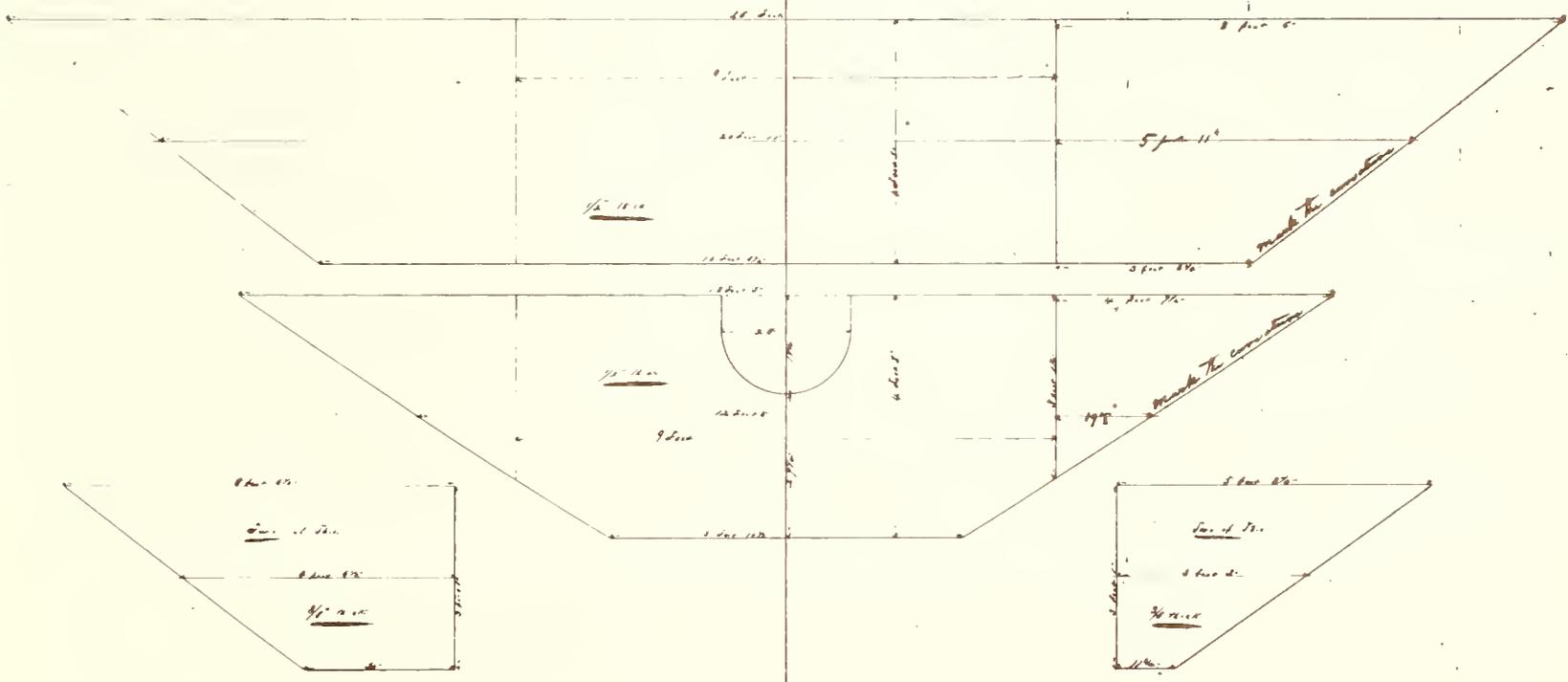
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the dimensions of the six transverse members of the main engine bulkhead. The top plate is located at frame 31, the center plate at frame 34, the lower left plate at frame 32, and the lower right plate at frame 33. The outboard ends of the plates carry the notations, "Mark the curvature." The horizontal center dimensions of each plate gives the ends of the sloping sides of the curvature necessary to match the hyperbolic curve of the hull at these sections.

Engine Bulkheads of the Ericsson Battery
 Scale $\frac{1}{4}$ inch = one foot



77. "ENGINE BULKHEADS OF THE ERICSSON BATTERY" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 78

Title: "ENGINE BULKHEADS OF THE ERICSSON BATTERY"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

10 1/2 inches by 23 5/8 inches

Size [Sight]:

8 1/2 inches by 9 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = one foot"

Rendered: ca. November 1861 (est.)

Original:

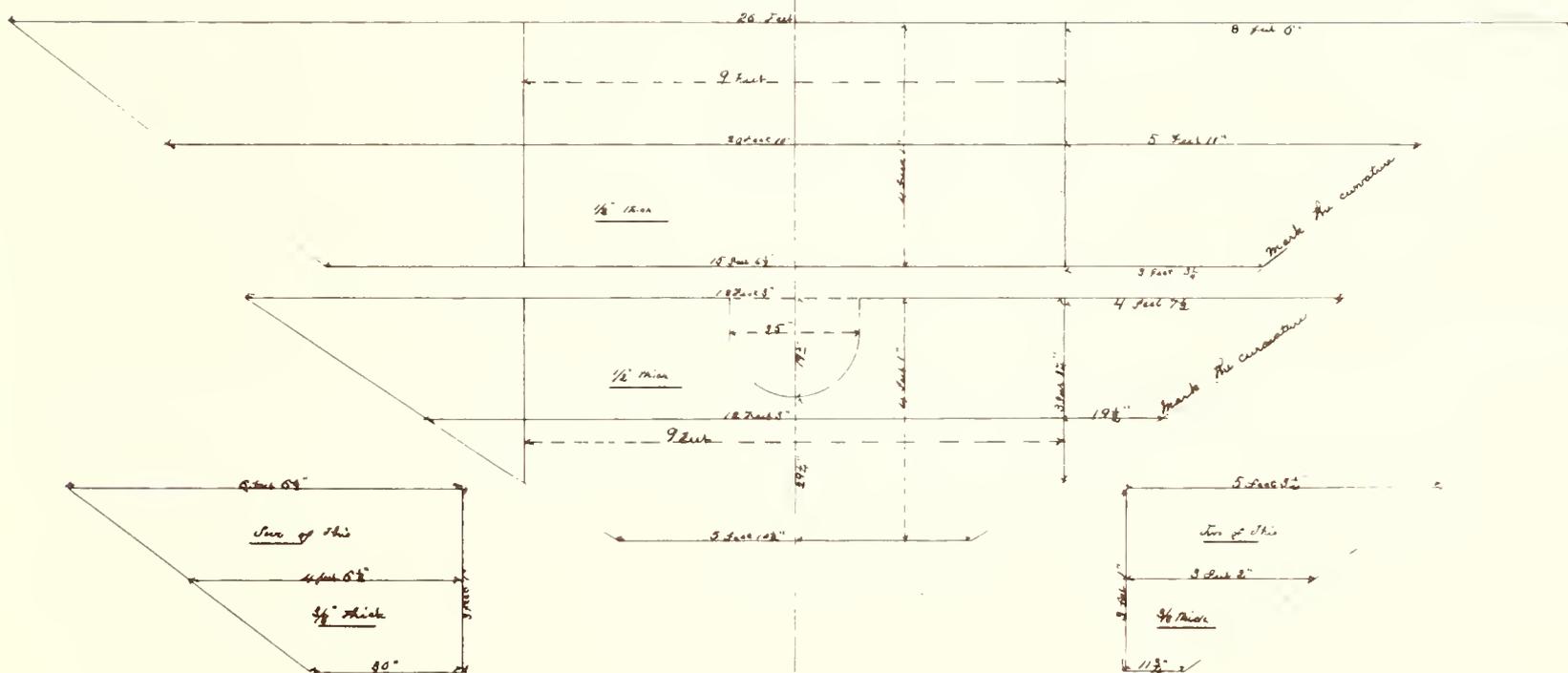
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 77.

Engine Bulkheads of the Ericsson Battery
 Scale $\frac{1}{4}$ inch = one foot



78. "ENGINE BULKHEADS OF THE ERICSSON BATTERY" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 79

Title: Engine Bulkheads and Keelsons

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

14 inches by 22 3/4 inches

Size [Sight]:

11 1/2 inches by 19 1/2 inches

Inscribed:

Rendered: ca. November 1861 (est.)

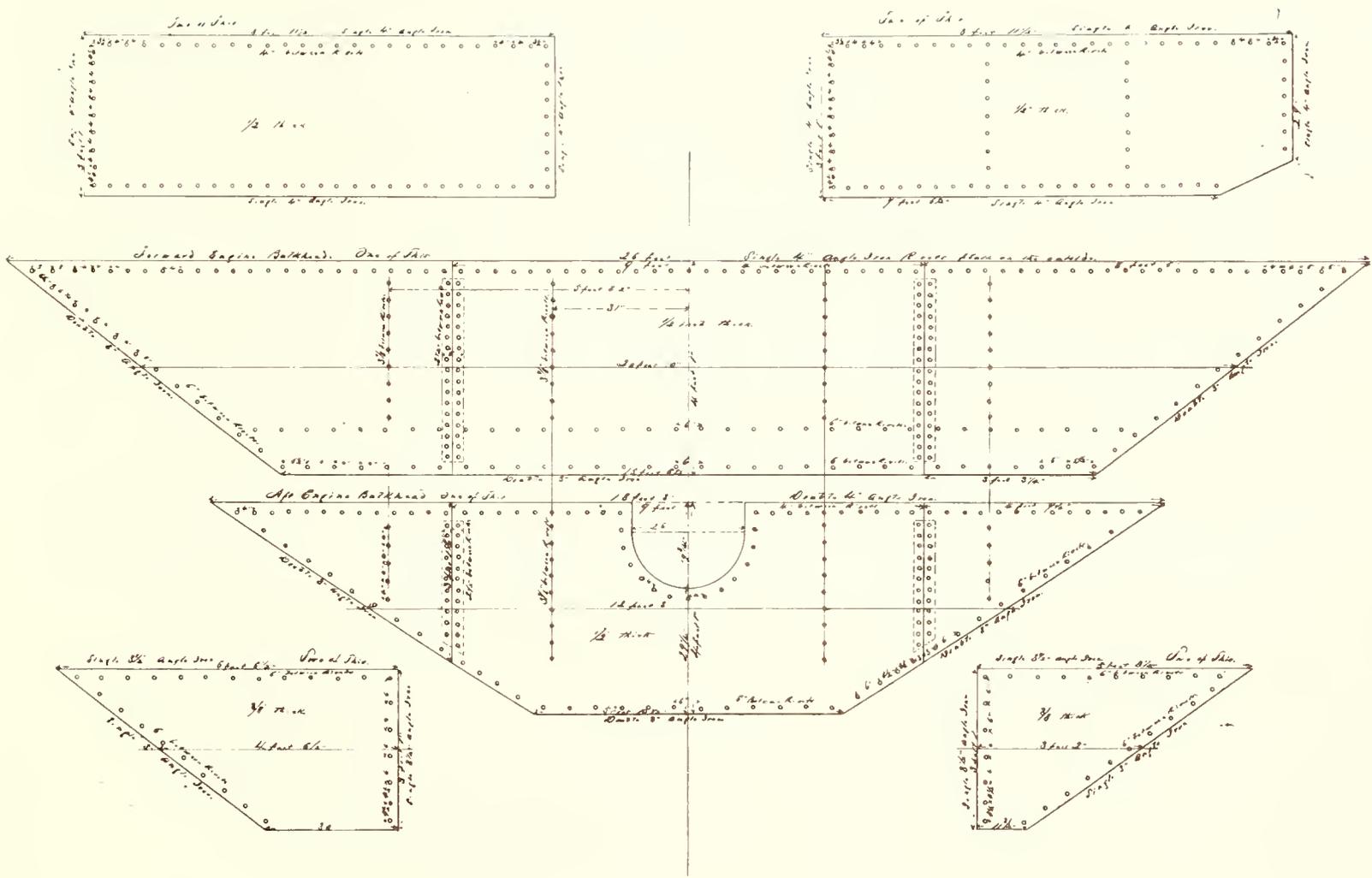
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the location of the rivets for joining the ten plates that form support for the main engine. The upper plates provide the longitudinal framing for the transverse plates, the right-hand plates are the outboard and the left-hand plates the inboard keelsons.



79. Engine Bulkheads and Keelsons (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 80

Title: Engine Bulkheads and Keelsons

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

13 1/4 inches by 22 1/2 inches

Size [Sight]:

11 1/2 inches by 19 1/2 inches

Inscribed:

Rendered: ca. November 1861 (est.)

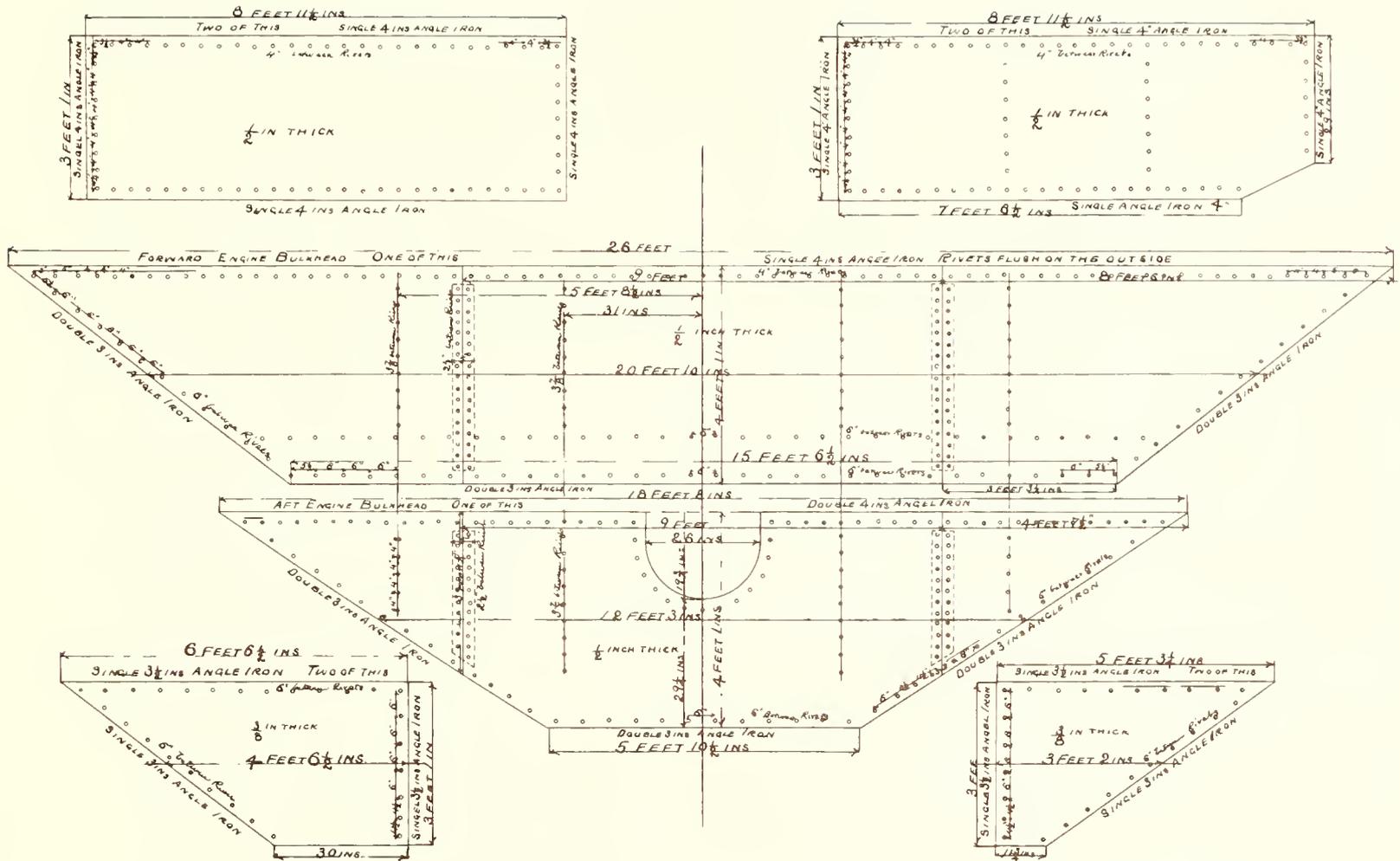
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 79.



80. Engine Bulkheads and Keelsons (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 81

Title: "BATTERY: ENGINE BULKHEADS"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black ink on paper.

Size [Sheet]:

19 inches by 34 1/2 inches (est.)

Size [Sight]:

14 1/2 inches by 32 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = 1 Foot"

Signature/Initials: "Monitor/C.M.W." [Pencil]
" 'Monitor'/Main Engine Bulkhead/C.M.W."

Rendered: ca. November 1861 (est.)

Original:

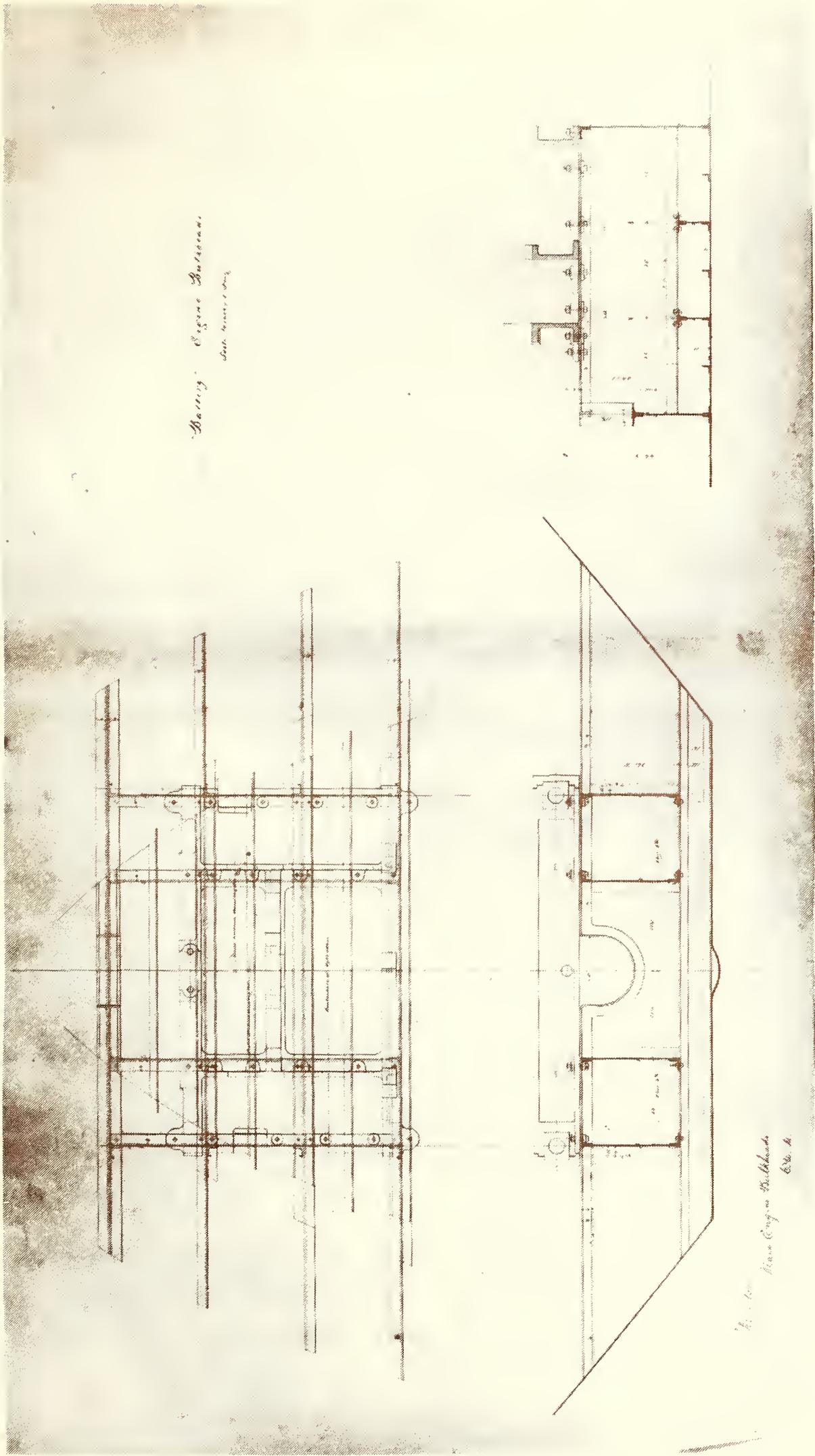
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 54(136)

Condition: Excellent, one corner chipped.

Remarks:

This drawing shows the assembly of the engine bulkheads and keelsons, the bolting of the engine frame to the bulkheads, and the bolting of the bulkheads to the floor timbers. In the transverse elevation of the after end of the assembly, looking forward on the starboard side outboard of the pillow block, there are pencil indications of three steps of a ladder leading up to the engine-room flat. Outboard of the ladder is a vertical area that blocks out the region for the starboard blower engine frame.



81. "BATTERY: ENGINE BULKHEADS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 82

Title: "BATTERY: ENGINE BULKHEADS"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, and red ink on tracing cloth.

Size [Sheet]:

25 1/2 inches by 9 7/8 inches

Size [Sight]:

25 inches by 8 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = 1 foot"

Rendered: ca. November 1861 (est.)

Original:

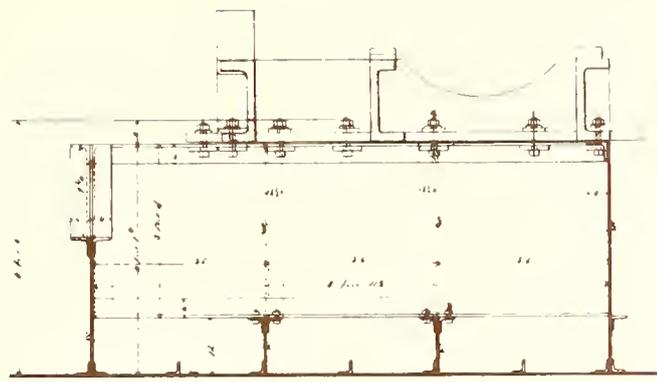
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

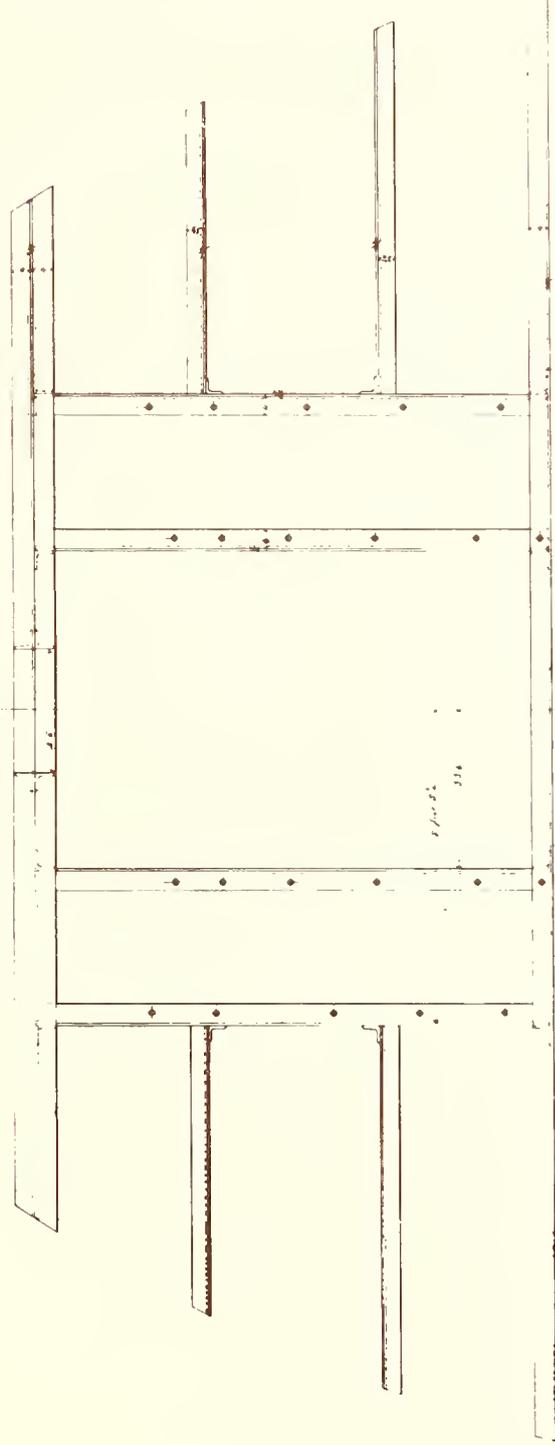
Remarks:

This drawing shows the top and side view of the assembled plates of the engine frame support.

10



Battery Engine Bulkhead Scale 1/4 inch = 1 foot



82. "BATTERY: ENGINE BULKHEADS" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 83

Title: "BATTERY: ENGINE BULKHEADS"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

26 inches by 9 5/8 inches

Size [Sight]:

25 inches by 8 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/4 inch = 1 foot"

Rendered: ca. November 1861 (est.)

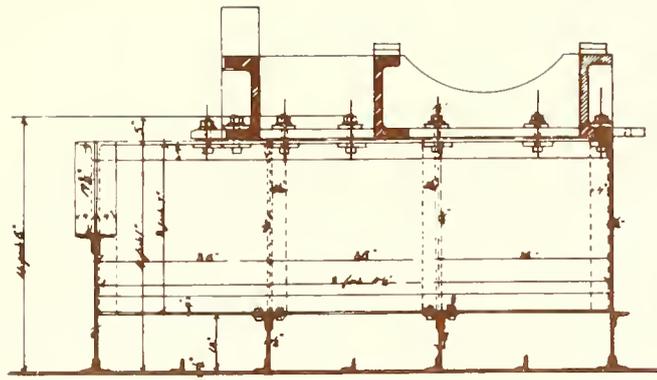
Original:

Location: Thomas F. Rowland, Jr. Collection

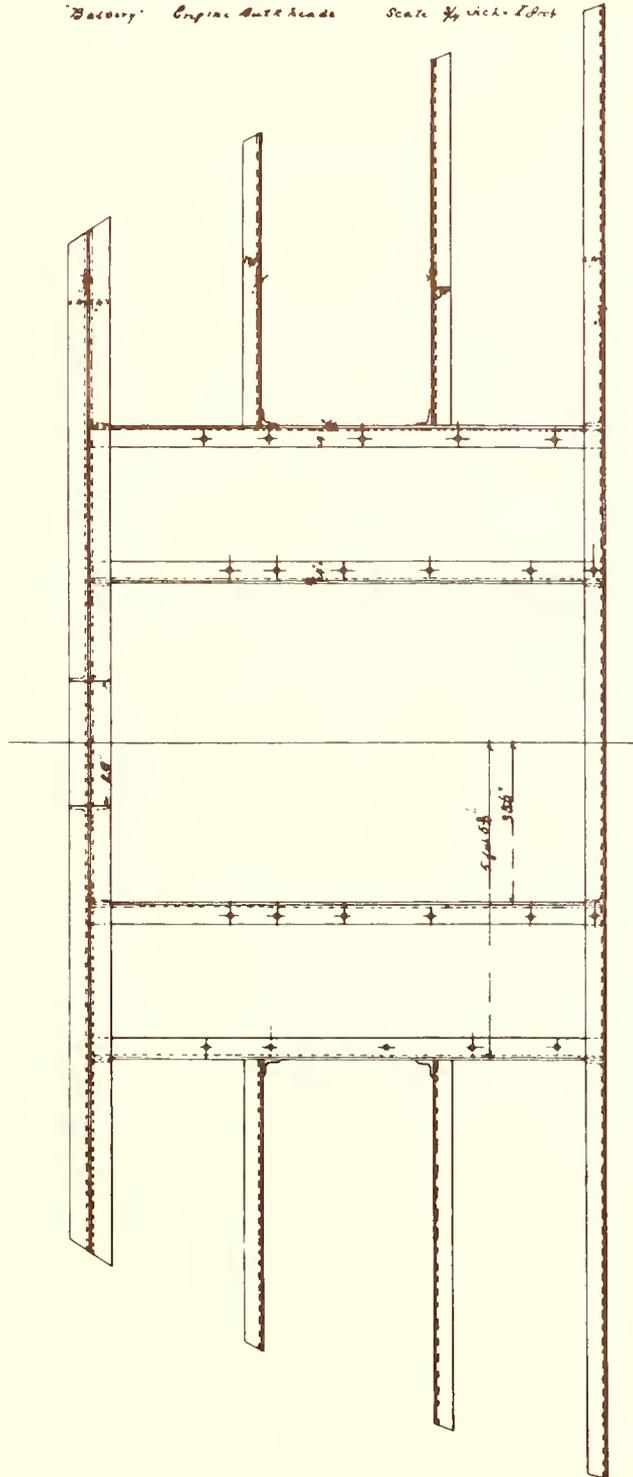
Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 82.



Battery Engine Bulkheads Scale $\frac{1}{4}$ inch = 1 foot



83. "BATTERY: ENGINE BULKHEADS" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 84

Title: “ ‘ERICSSON BATTERY:’ AFT BULKHEAD AND COAL BUNKERS”

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

13 5/8 inches by 18 inches

Size [Sight]:

9 1/4 inches by 15 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: “3/8 inch = one foot”

Rendered: ca. November 1861 (est.)

Original:

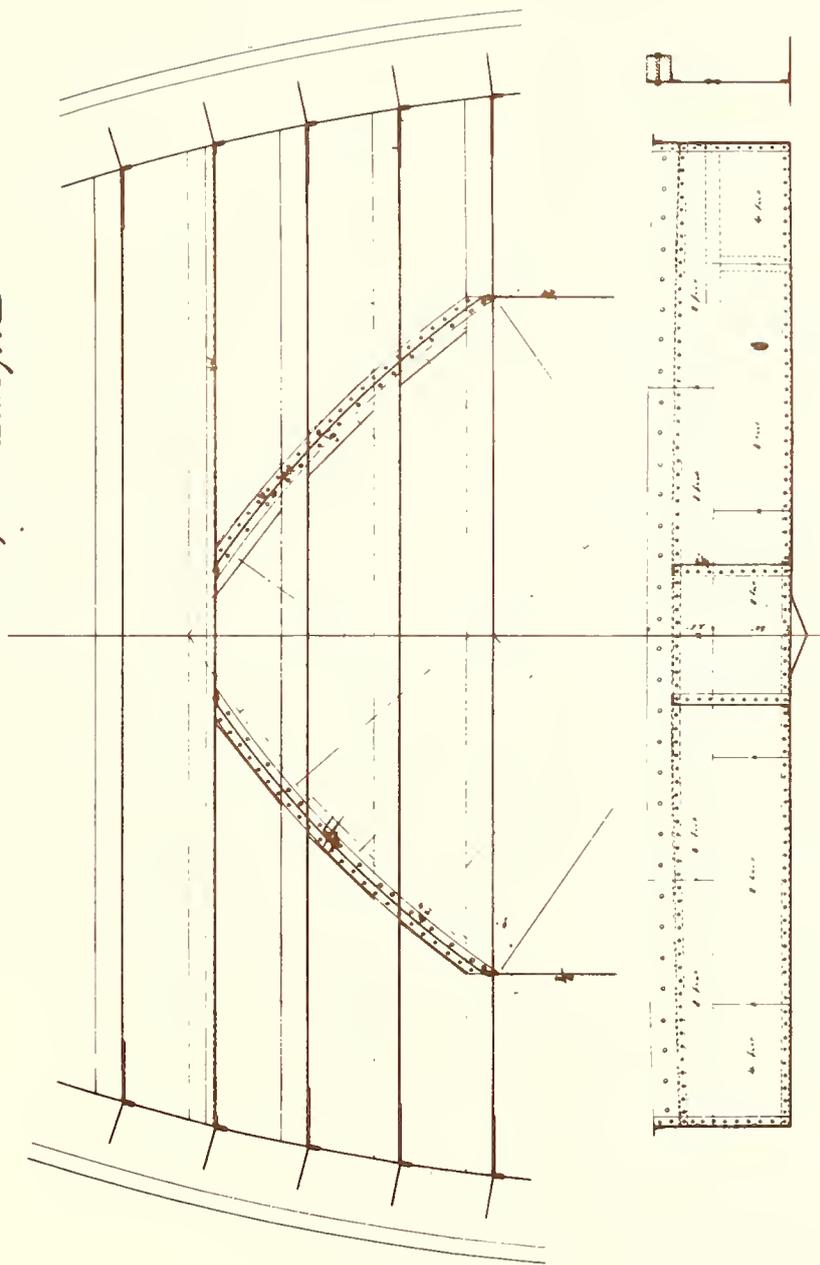
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

Shown in this drawing is the location of the longitudinal bulkheads ending at frame 35 and the after, transverse coal bunker bulkheads at frame 38. The longitudinal and transverse bulkheads are joined by a diagonal bulkhead. The diagonal bulkhead is riveted at the bottom to the angle iron on the overhang and to angle iron at the top carried by diagonal carlings between the deck beams.

*Ericsson Battery: Aft Bulkhead and Coal Bunkers
Scale 7/16 inch = one foot*



84. "ERICSSON BATTERY: AFT BULKHEAD AND COAL BUNKERS" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 85

Title: " 'ERICSSON BATTERY:' AFT BULKHEAD AND COAL BUNKERS"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and brown ink on tracing cloth.

Size [Sheet]:

12 1/2 inches by 17 1/2 inches

Size [Sight]:

9 1/2 inches by 15 1/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/8 inch = one foot"

Rendered: ca. November 1861 (est.)

Original:

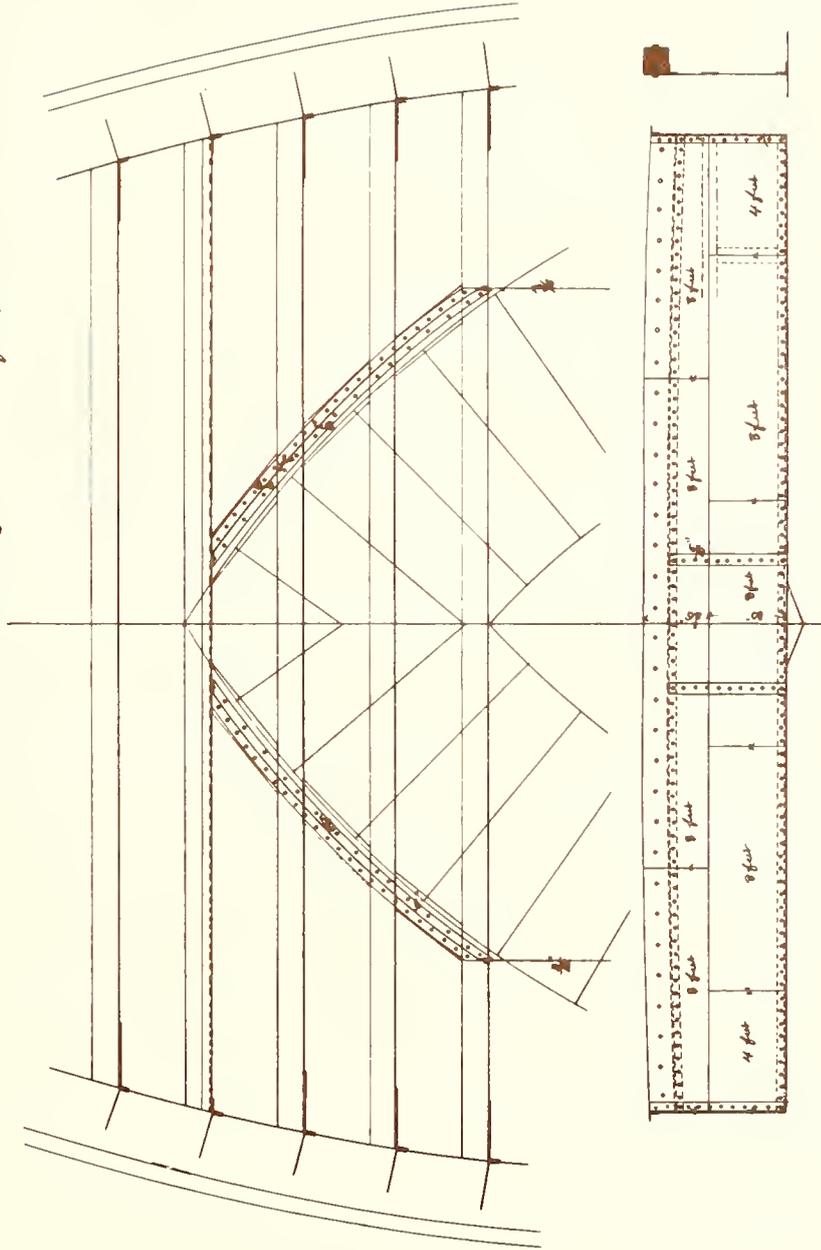
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 84.

Ericsson Battery: Aft Bulkhead and Coal Bunkers
Scale of inch = one foot.



85. "ERICSSON BATTERY: AFT BULKHEAD AND COAL BUNKERS" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 86

Title: "TRUSS FRAMES"

Date of Subject:

December 3, 1861

Draftsman/Life Dates:

Unknown

Medium: Black ink on tracing cloth.

Size [Sheet]:

12 1/4 inches by 11 3/4 inches

Size [Sight]:

9 3/4 inches by 10 5/8 inches

Inscribed:

Title Block/Caption: See title

Scale: "3/8 inch"

Notes: "Continental Iron Works"

Signature/Initials: "J.F. Rowland"

Rendered: "Decr 3d 1861"

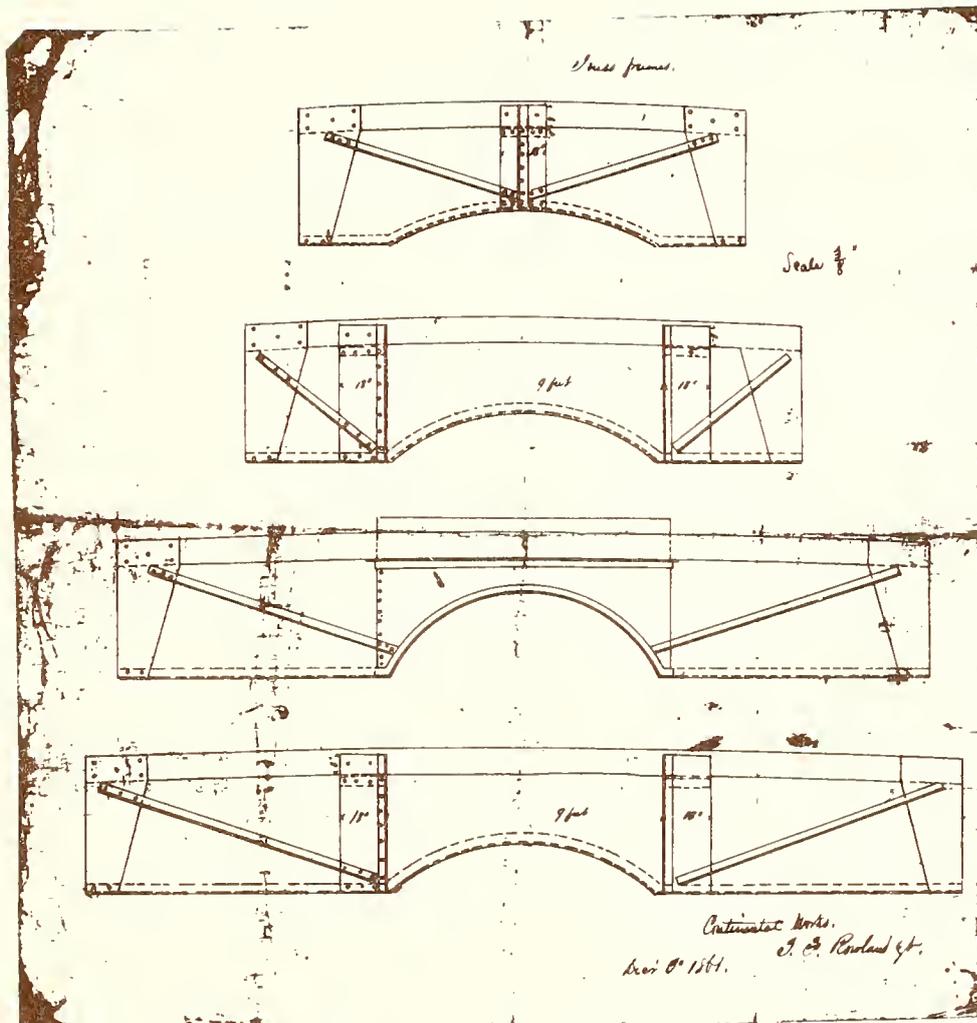
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Dirty

Remarks:

This drawing shows four transverse sections of the stern overhang. This drawing provides information on the internal bracing of this part of the ship and permits an accurate depiction of the propeller race and the camber of the deck beams at these locations. The sections are located from top to bottom at frame 45, 44, 41, and 40 respectively. The camber of the section of frame 40 indicates that the flat of the deck aft does not extend to this point.



86. "TRUSS FRAMES" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 87

Title: "TRUSS FRAMES"

Date of Subject:

December 3, 1861

Draftsman/Life Dates:

Unknown

Medium: Black ink on tracing cloth.

Size [Sheet]:

13 7/8 inches by 12 3/4 inches

Size [Sight]:

9 3/4 inches by 10 3/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3/8 inch"

Notes: "Continental Works"

Signature/Initials: "T. F. Rowland Agt."

Rendered: "Decr 3rd 1861"

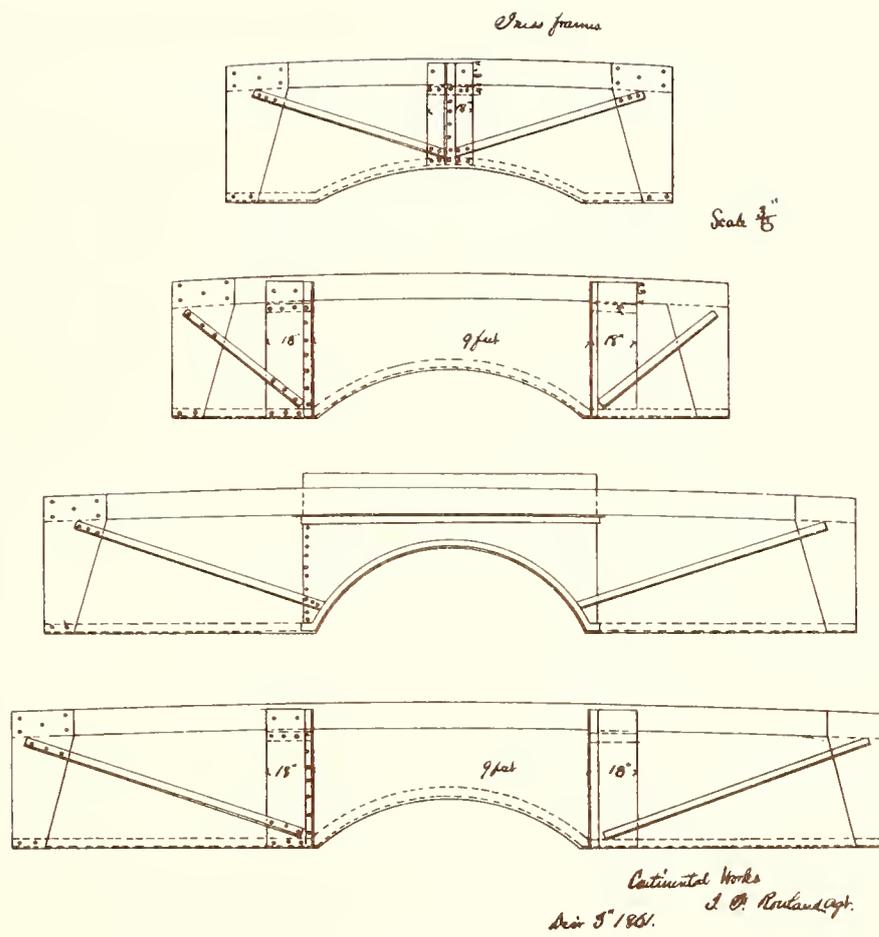
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 86.



87. "TRUSS FRAMES" (Thomas F. Rowland, Jr. Collection)

**STERN ARRANGEMENTS, MAIN DECK ARMOR
AND ANCHOR WELL
Numbers 88-99**

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 88

Title: "PLATE BOX OVER PROPELLER, RUDDER, STERN BRACES & C."

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

18 1/2 inches by 39 1/2 inches (est.)

Size [Sight]:

16 1/2 inches by 32 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = one foot"

Notes:

"Dec 13, ordered from Mr. Whitney"

"2 plates 64" diameter x 15/16 inch"

"2 plates 120" x 30 square x 15/16 inch"

Signature/Initials: "Rough Sketch/made by Capt. Ericsson for
draftsman/C.W.M." [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. 13 December 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 61(147)

Condition: Good

Publication:

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications Inc., 1978, p. 29.

Remarks:

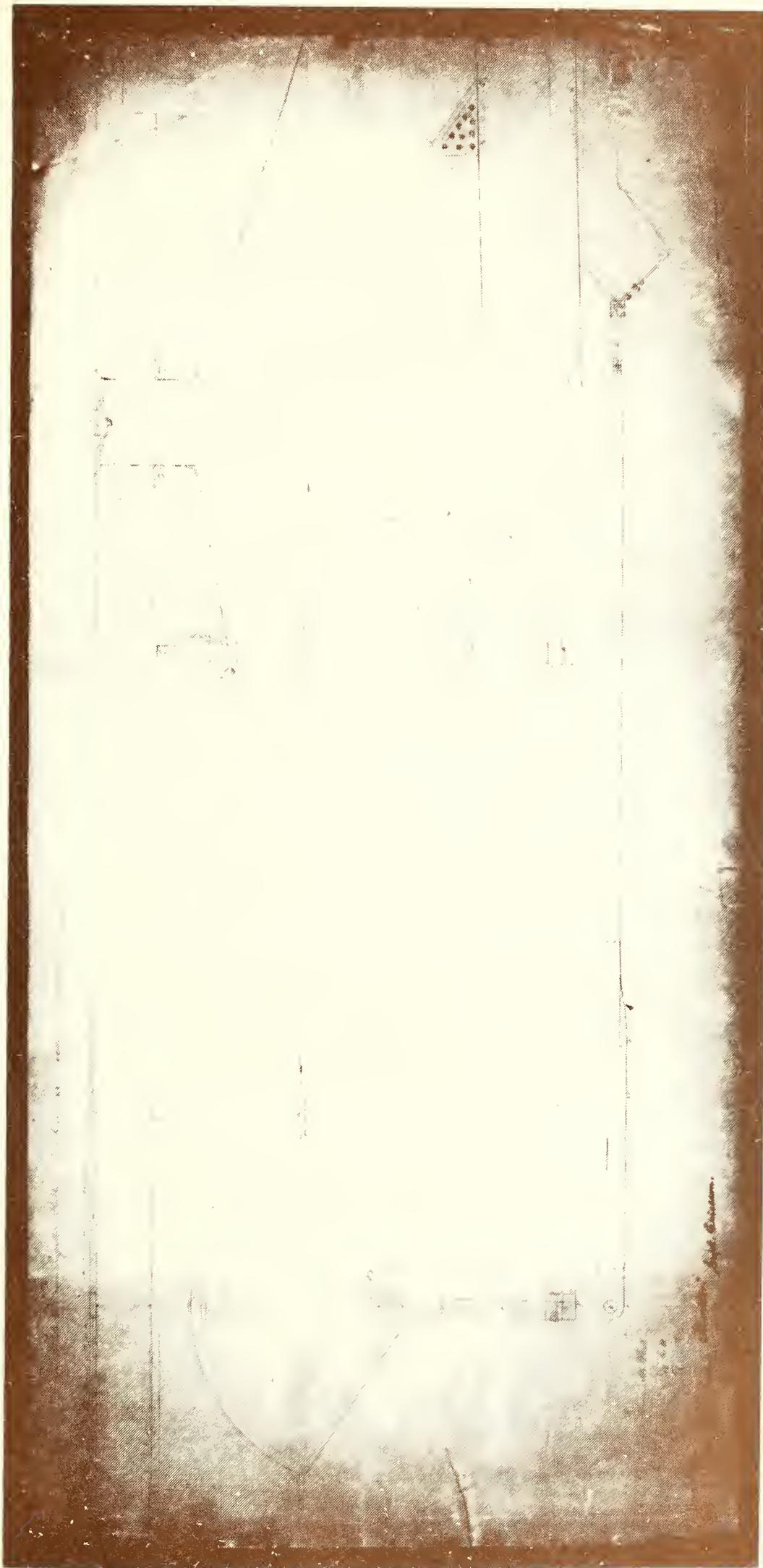
This drawing shows a transverse elevation of a section through the Y-shaped stern brace, a longitudinal section through the centerline of the overhang from the forward to the

after edges of the propeller race, and two auxiliary views of the skeg. The views of the skeg show that it is inclined 6 inches below the lowest point of attachment to the hull at a distance of 18 feet 10 inches aft. The view also shows the details of the hoisting ring in the plate box cover, the stuffing tube for the rudder stock, the rudder, the propeller shaft and bearing, and the curvature of the propeller race at the plate box and the rudder stock stuffing tube.

A note over the plate box cover says it is "to be curved [transversely], as the deck." A line running parallel to and a few inches below the profile of the deck is labeled, "Top of side armor," corresponding to the sheer of the deck edge. The camber of the deck at this section can be determined from this line.

A plate is indicated as being attached to the underside of the deck beams and directly over the top of the rudder stock. This may provide a foundation for a clutch and rudder post extension to allow an above-deck tiller bar to be attached to the rudder stock. Chains for this arrangement would be attached to the tiller bar to run forward along the deck to an auxiliary steering wheel on the turret roof. A hatch would be provided for access to the top of the rudder post as seen in the *Passaic*- and *Canonicus*-class monitor drawings.

The order "from Mr. Whitney" of December 13, probably refers to the 64-inch-diameter anchor well cover (see Catalog Drawings 98 and 100) and the 120 inches by 30 inches cover over the propeller well.



88. "PLATE BOX OVER PROPELLER, RUDDER, AND STERN BRACES & C."
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 89

Title: "BATTERY RUDDER STERN BRACES & ETC."

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

15 inches by 35 inches

Size [Sight]:

13 inches by 22 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 ins. = 1 foot"

Signature/Initials: "T. F. Rowland"

Rendered: "Copy June 5, 1862"

Original:

Location: Thomas F. Rowland, Jr. Collection

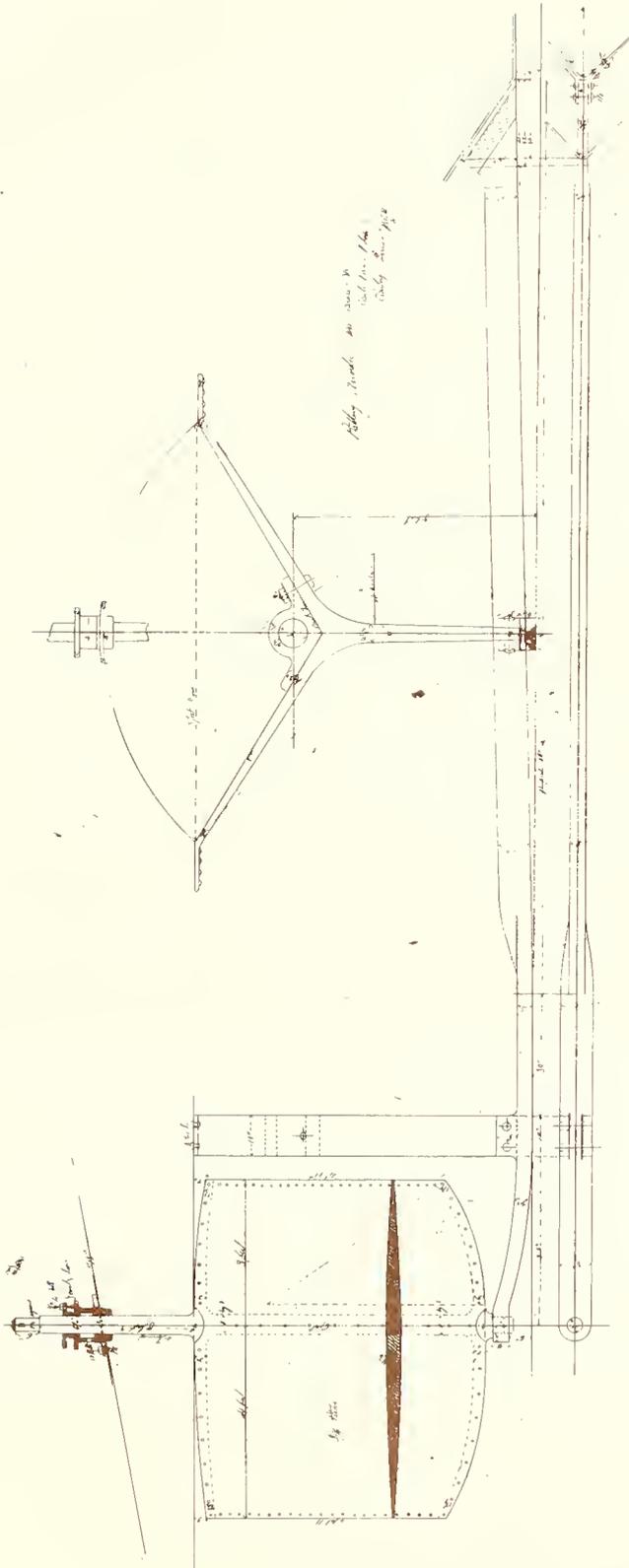
Condition: Some spotting.

Publication:

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications Inc., 1978, p. 28.

Remarks:

Similar to portions of Catalog Drawing 88.



89. "BATTERY RUDDER STERN BRACES & ETC." (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 90

Title: Stern Brace Riveting

Date of Subject:

December 13, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 1/2 inches by 7 5/8 inches

Size [Sight]:

1 1/8 inches by 2 3/4 inches

Inscribed:

Notes: See "Remarks"

Signature/Initials: "J. Ericsson"

Rendered: "Dec. 13, 1861"

Original:

Location: Robert Rowland Coykendall Collection

Identification: Ericsson to Rowland, letter of 13 December 1861

Condition: Good

Remarks:

In this previously unpublished letter Ericsson reports to Rowland his unfavorable impression of the progress being made on the installation of the deck beams and the iron work at the Continental Iron Works. Ericsson was especially concerned about the installation of the stern brace, as its installation was necessary before the machinery and stern arrangements could be completed. He indicated in a sketch in the letter where the riveting of the stern brace should be completed. "Please rivet up the part where the propeller post is to be attached without a moments delay, I mean at aa." This letter was uncharacteristic of Ericsson's otherwise harmonious relationship with Rowland.

Please write up the cost in line with
whether cost is to be attached or. Hand a
minute delay. a 1.0000

a a a

Yours most truly
W. Nicholas

F. F. Paulsen, Secy
Green Point

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 91

Title: "ERICSSON BATTERY. RUDDER"

Date of Subject:

October 23, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and black, blue, red and brown ink on tracing cloth.

Size [Sheet]:

15 inches by 10 1/2 inches

Size [Sight]:

12 1/2 inches by 7 inches

Inscribed:

Title Block/Caption: See title.

Notes: "Rec'd with letter dated 23 Octr 1861"

Rendered: ca. 22 October 1861 (est.)

Original:

Location: National Archives

Identification:

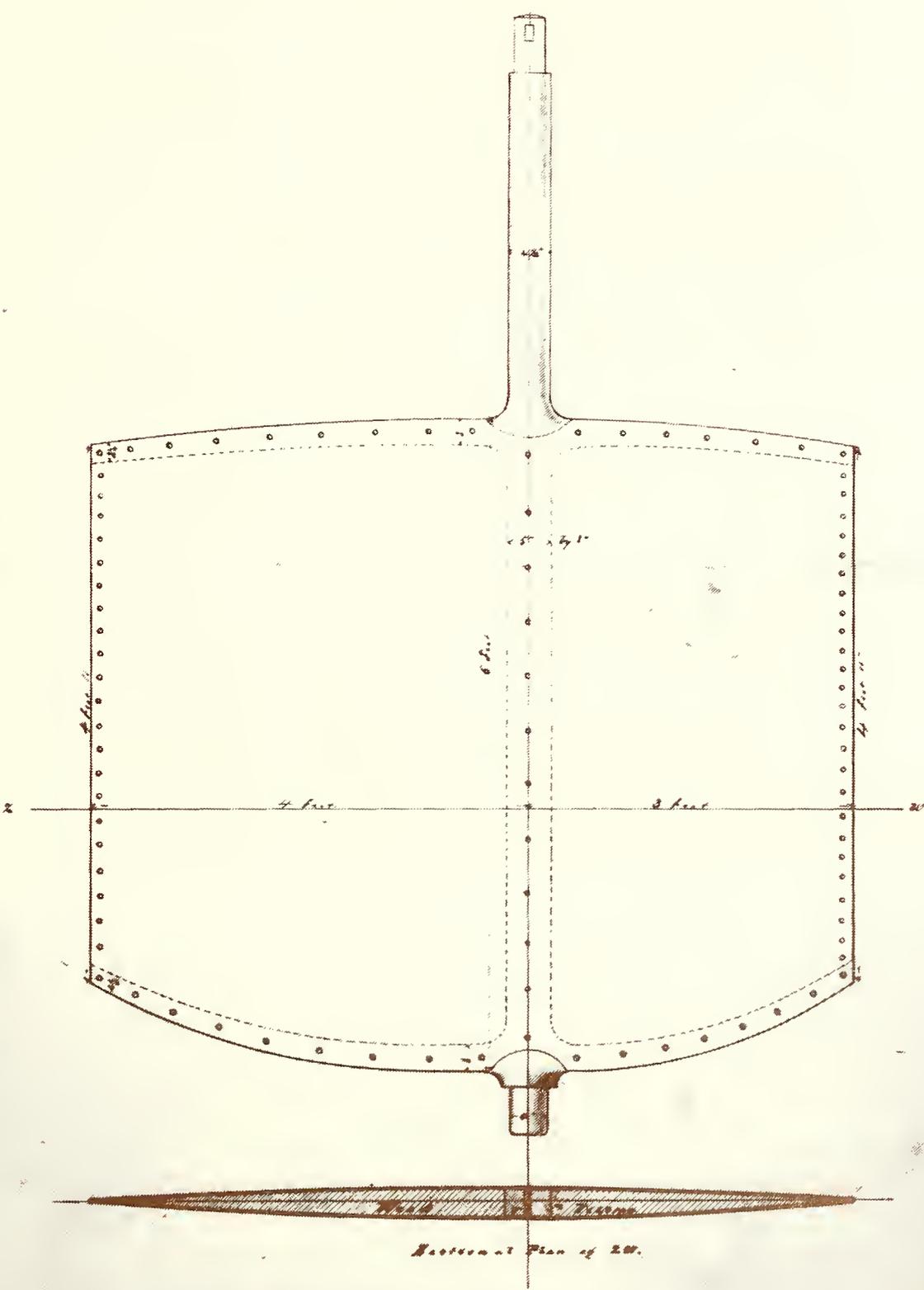
Record Group 71, Records of the Bureau of Yards and Docks, Entry 5, Letters Received, Misc. E86, J. Ericsson to Cmdor. J. Smith, letter of October 23, 1861.

Remarks:

This drawing was an enclosure to Ericsson's letter of October 23, 1861, to Commodore J. Smith in response to Smith's request of October 21, 1861. The drawing shows a side and top "sectional plan" of the wood-filled, 6-foot-by-7-foot equipoise rudder. The H-shaped framework carries the 4 1/2-inch-diameter rudder stock. The forward and after edges are formed by riveting together the port and starboard side plates.

dated 20 Oct. 1857.

Ericsson Battery Rudder



91. "ERICSSON BATTERY. RUDDER" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 92

Title: "THE ERICSSON BATTERY, PLATE BOX OVER PROPELLER"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

11 1/2 inches by 41 1/4 inches

Size [Sight]:

9 inches by 40 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Rendered: ca. December 1861 (est.)

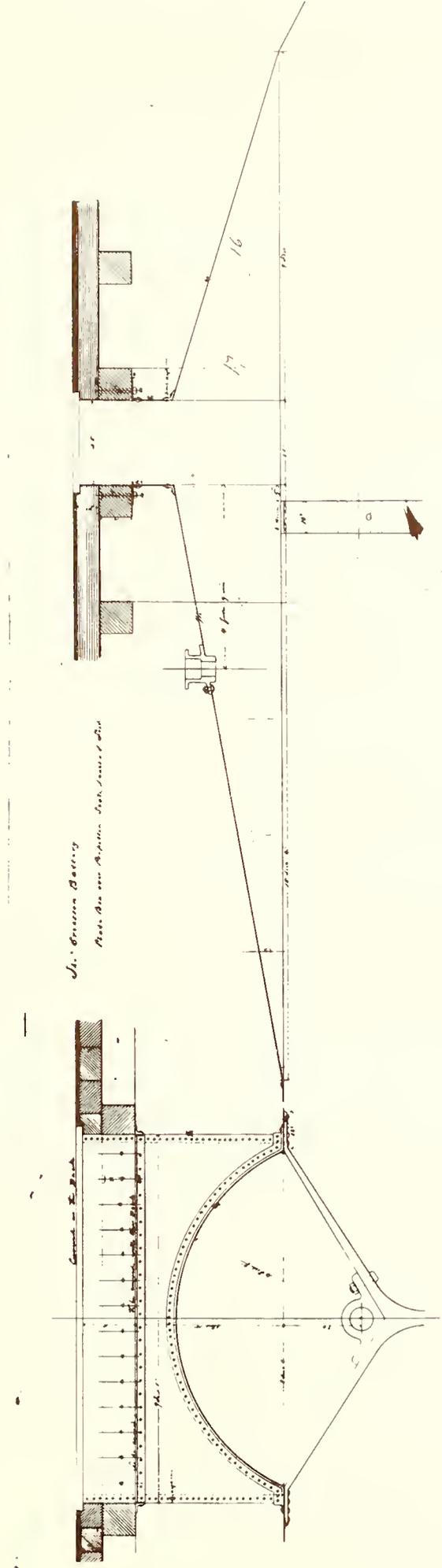
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the construction of the propeller well, plate box, and propeller well hatch cover. The notation that the hatch is to "curve to the deck in the transverse direction" indicates that the flat of the deck aft does not extend to this point. The numbers "47" through "54" marked lightly over the vertical lines dropped from the forward face of the deck beams correspond to the beam number from the bow.



92. "THE ERICSSON BATTERY, PLATE BOX OVER PROPELLER" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 93

Title: "THE ERICSSON BATTERY/PLATE BOX OVER PROPELLER"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

11 1/8 inches by 43 3/8 inches

Size [Sight]:

9 inches by 40 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Rendered: ca. December 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 92. The distance in the transverse section from the bottom of the hatch rabbet of the angle iron under the deck beam was traced incorrectly and should read "16" vs. "10."

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 94

Title: " 'ERICSSON BATTERY,' DECK PLATES"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

23 1/2 inches by 17 3/4 inches

Size [Sight]:

21 inches by 15 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 inch = 1 Foot"

Rendered: ca. December 1861 (est.)

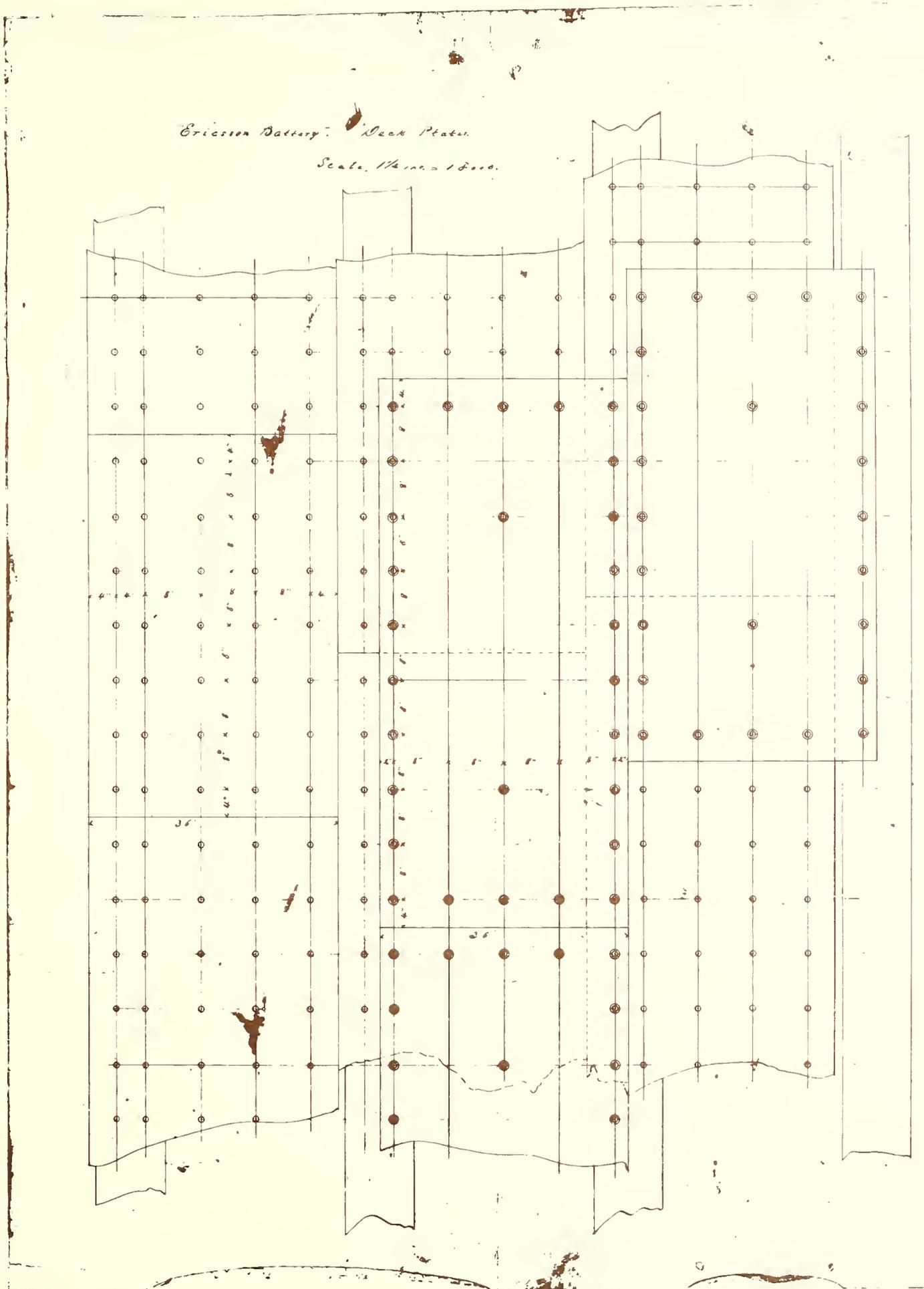
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Ink smudges and hand print stains

Remarks:

This drawing shows the manner in which the upper and lower courses of 1/2-inch iron deck plates are arranged and spiked to the wood planking. The plates are placed with their long axes athwartships, and the courses are shifted so the edges do not coincide. Forward is assumed to be to the right, with the upper plate edges centered over the deck beams.



94. "ERICSSON BATTERY, DECK PLATES" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 95

Title: " 'ERICSSON BATTERY,' DECK PLATES"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

23 3/4 inches by 17 3/4 inches

Size [Sight]:

21 inches by 15 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 inch = 1 Foot"

Rendered: ca. December 1861 (est.)

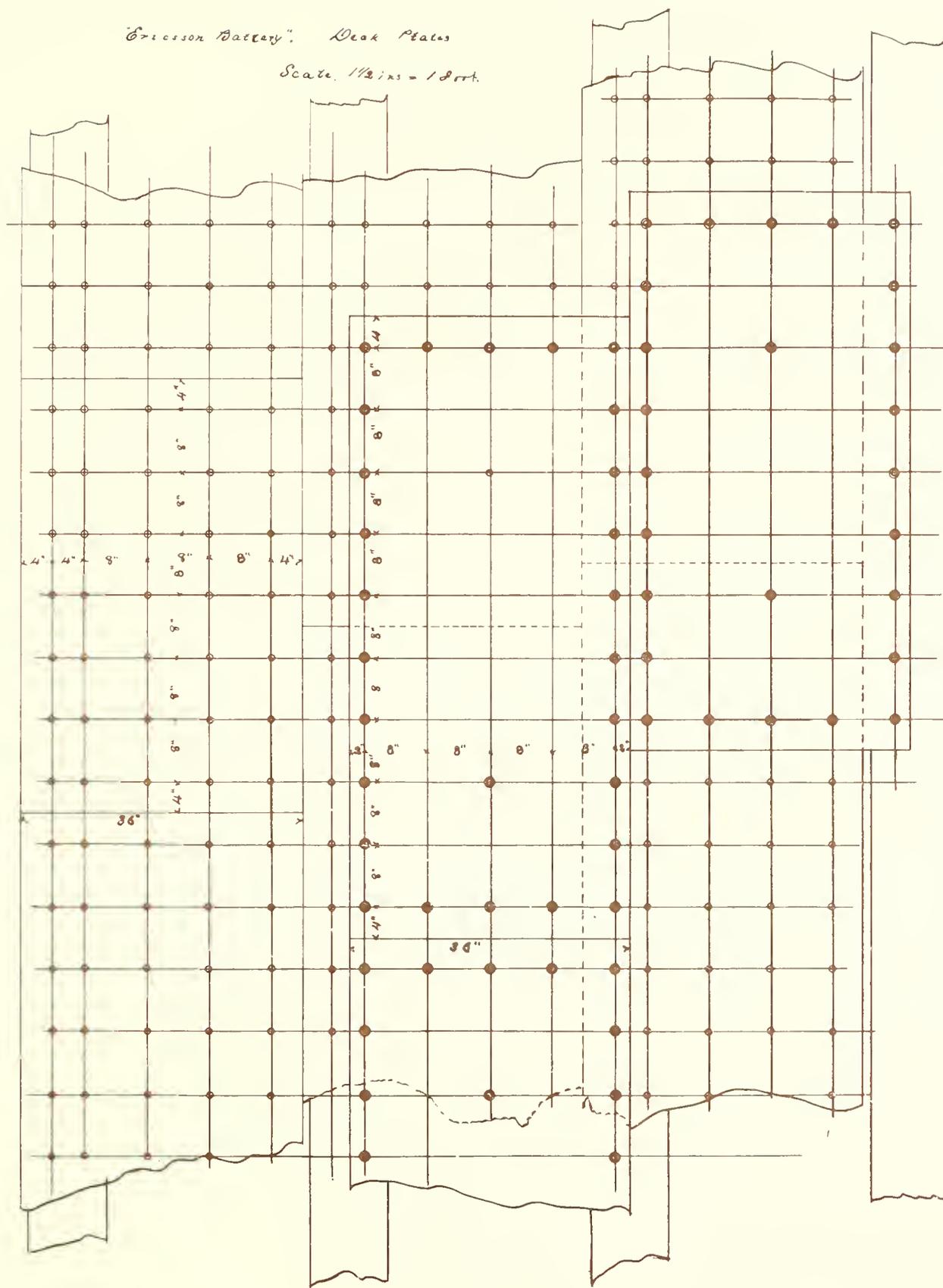
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 94.



95. "ERICSSON BATTERY, DECK PLATES" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 96

Title: Deck Light Locations

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

8 inches by 18 inches

Size [Sight]:

7 1/8 inches by 7 inches

Inscribed:

Rendered: ca. December 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Slightly spotted

Remarks:

This drawing is a plan view of the forward part of the vessel showing deck beams and circular figures that represent the location of the deck lights in the boatswain's lockers, the anchor hoister room, the eight officers' cabins, and the wardroom. The beams are numbered "1" (frame 2) through "9" (frame 10) aft of the two heavy beams supporting the pilothouse and "1" and "2" forward.



96. Deck Light Locations (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 97

Title: Deck Light Locations

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

8 1/4 inches by 18 5/8 inches

Size [Sight]:

7 1/8 inches by 7 inches

Inscribed:

Rendered: ca. December 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 96.



97. Deck Light Locations. (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 98

Title: "POSITION OF RIVETS IN WELL HOLE COVER OF CAPT. ERICSSON'S
[sic.] BATTERY"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

13 3/4 inches by 12 1/2 inches

Size [Sight]:

7 1/2 inches by 7 1/2 inches

Inscribed:

Title Block/Caption: See title.

Rendered: ca. December 1861 (est.)

Original:

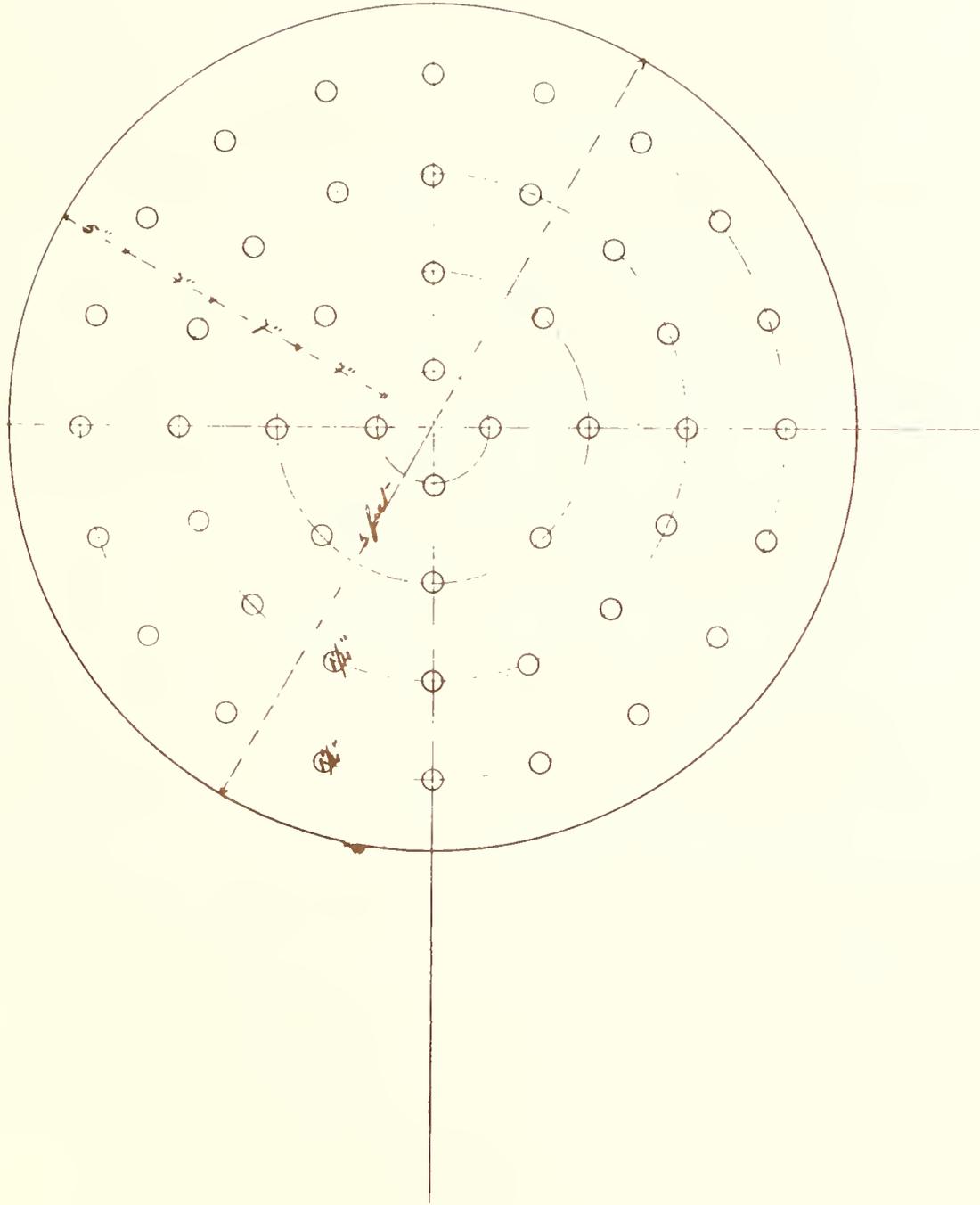
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the rivet pattern fastening the circular plates that form the domed cover of the anchor well. Inasmuch as the anchor well is 5 feet in diameter, the actual cover should probably be 5 feet 4 inches in diameter (see Catalog Drawing 88).

Position of rivets in well hole cover
of Capt. Ericsson's Battery



98. "POSITION OF RIVETS IN WELL HOLE COVER OF CAPT. ERICSSON'S [sic.] BATTERY" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 99

Title: "POSITION OF RIVETS IN WELL HOLE COVER OF CAPT. ERICSSON'S [sic.] BATTERY"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black ink on tracing cloth.

Size [Sheet]:

15 1/2 inches by 13 inches

Size [Sight]:

7 1/2 inches by 7 1/2 inches

Inscribed:

Title Block/Caption: See title.

Rendered: ca. December 1861 (est.)

Original:

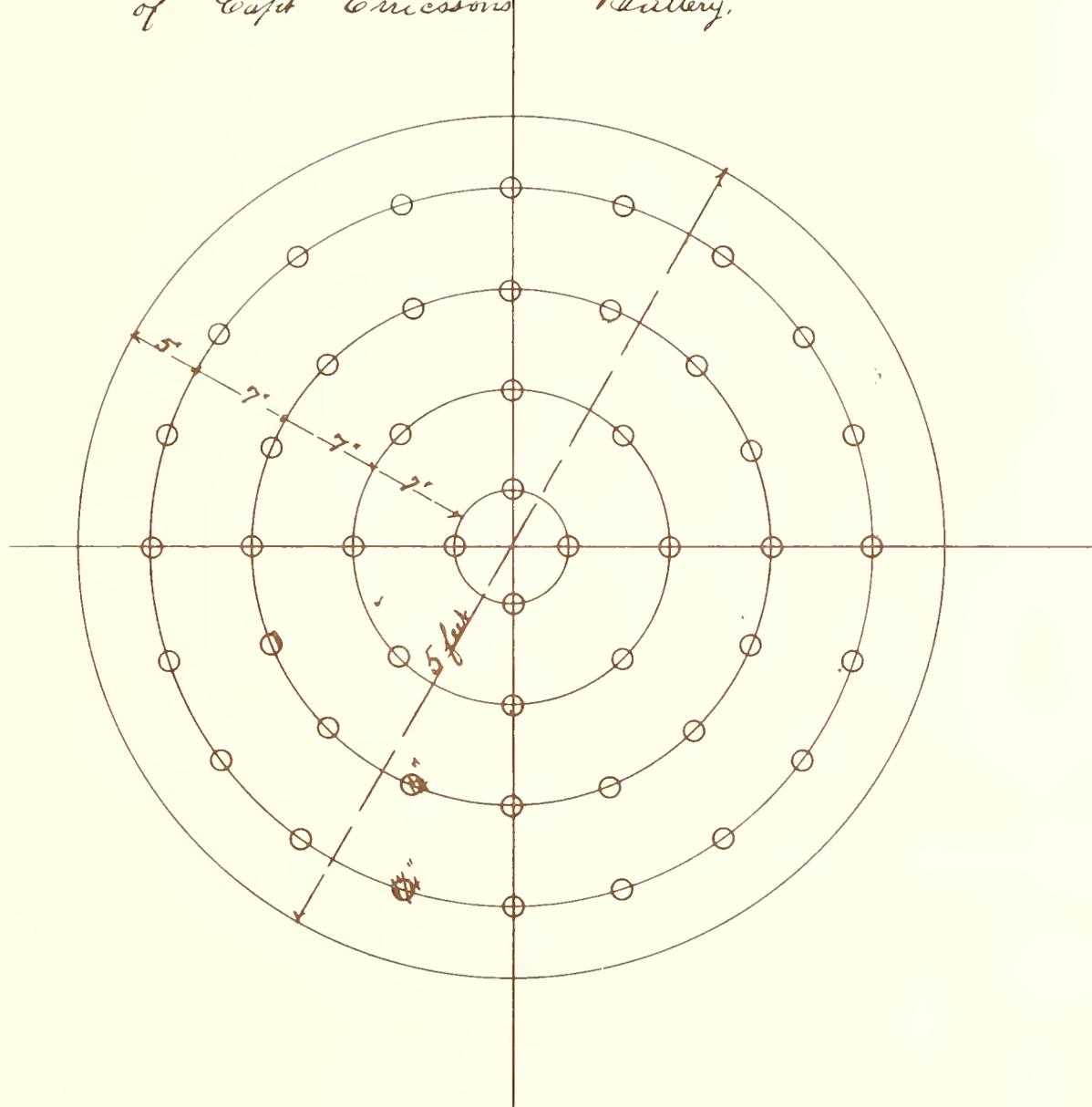
Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 98.

Position of rivets in well hole cover
of Capt Ericsson's Battery.



99. "POSITION OF RIVETS IN WELL HOLE COVER OF CAPT. ERICSSON'S [sic.] BATTERY" (Thomas F. Rowland, Jr. Collection)

GROUND TACKLE

Number 100

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 100

Title: "ANCHOR"

Date of Subject:

ca. December 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and white photograph

Size [Sheet]:

8 inches by 10 inches

Size [Sight]:

7 inches by 7 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Notes:

"Wrought Iron Rough"

This drawing bears a Swedish museum stamp in reverse:

"KRIGSARKIVET"

"30/1957"

"Utländska fartyg

"Kra. N^o 19. Box U.2.

Sjöh Mus. Arkiv Ö"

R N:r 6447:3."

Rendered: ca. November 1861 (est.)

Original:

Location: Division of Naval History
Smithsonian Institution

Identification: Photographic Negative N. 62820

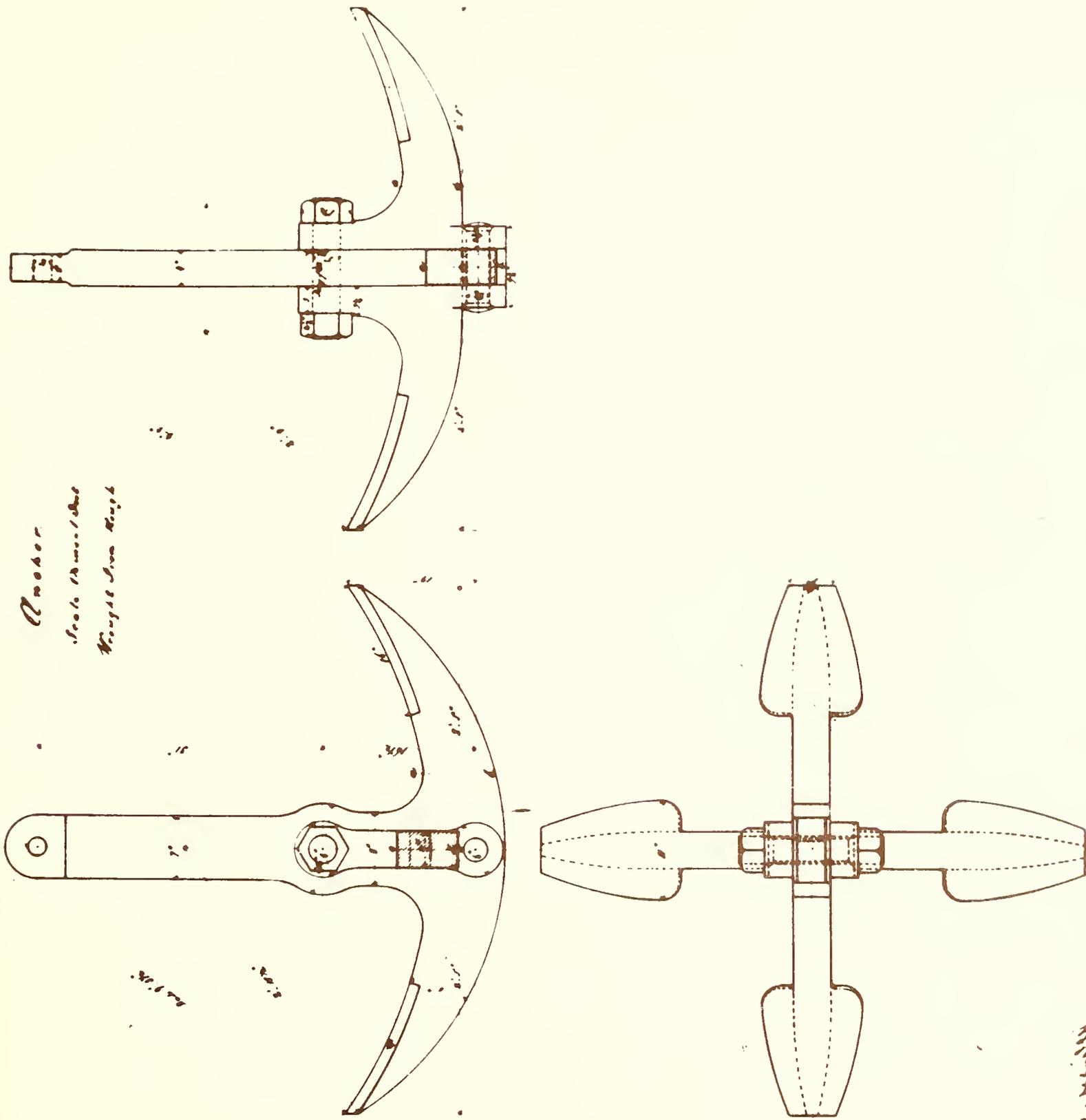
Condition: Good

Publication:

Edward M. Miller, editor *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 3 volumes, 1974, p. 116.

Remarks:

This drawing shows the unique, four-fluked anchor of the *Monitor*, 4 feet 10 inches across the arms with 2 inches of clearance for hoisting up in the 5-foot-diameter anchor well. This stockless anchor is made in three pieces, with the transverse arms bolted and pinned to the shank. The weight is estimated to be 1,310 pounds.



BOILERS AND FITTINGS
Numbers 101-106

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 101

Title: “ ‘BATTERY.’ SMOKE PIPE AND DOORS FOR BOILERS.”

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue and red ink on buff paper.

Size [Sheet]:

19 inches by 24 1/2 inches (est.)

Size [Sight]:

16 1/2 inches by 22 1/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: “1 1/2 ins. = 1 Foot”

Signature/Initials: “Monitor/C.W.M.” [Pencil]
“ ‘Monitor’/C.W.M.” [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 70(112)

Condition: Excellent

Publication:

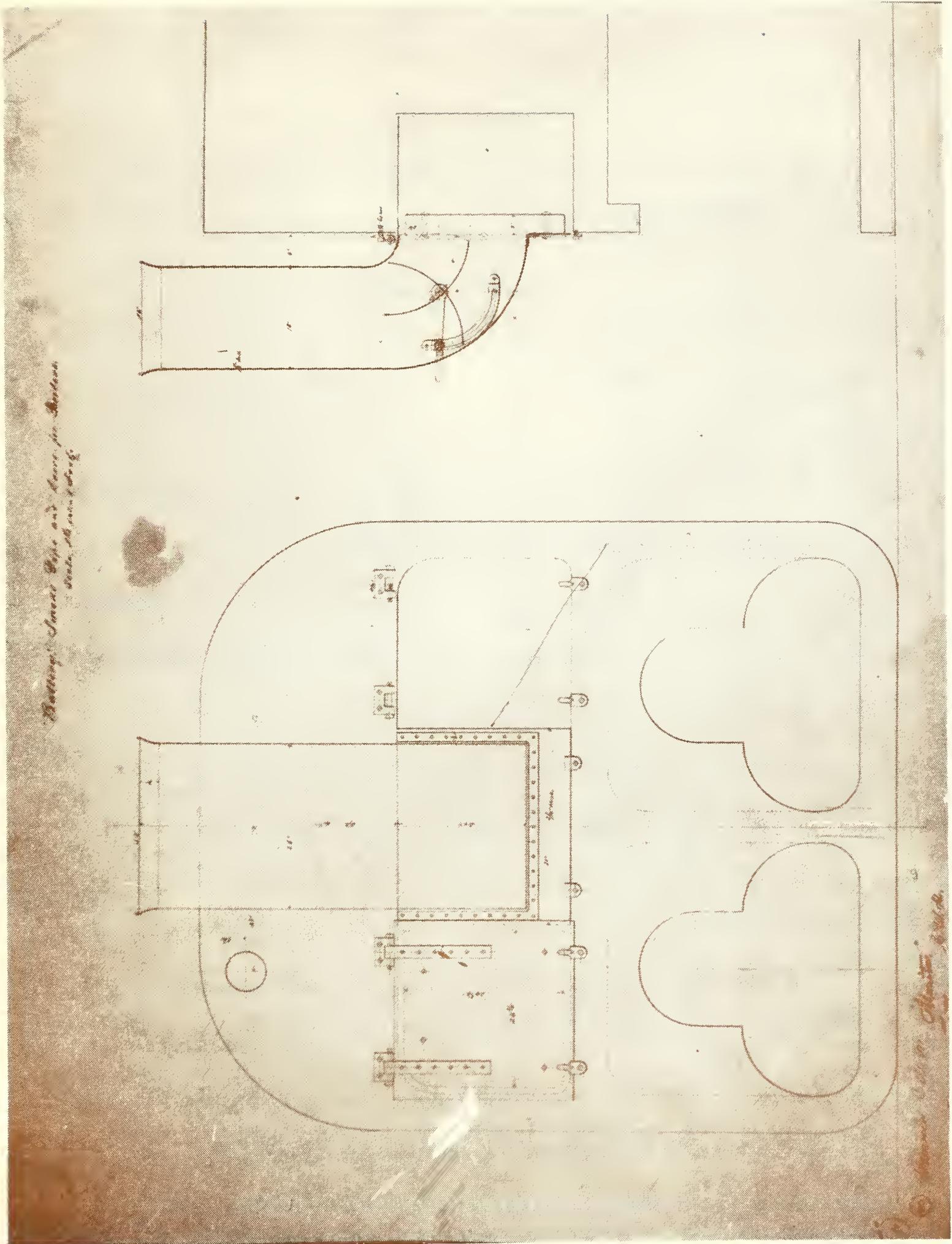
Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 29.

Remarks:

This drawing shows the starboard boiler front and side looking forward and to port respectively. The side view includes the uptake damper and controls. The view of the front gives the details of the three uptake doors, the center being fixed¹ and the two others hinged and movable. The steam stop valve is bolted to the upper-left quadrant of the boiler front and connects to the internal dry steam pipe. The port boiler would be identical but on the opposite hand.

Footnotes:

¹ B. F. Isherwood. "Experiments with the Machinery of the U.S. Iron Clad Steam Battery 'Monitor'," *Experimental Researches in Steam Engineering*, Vol. 1, Philadelphia: Hall of the Franklin Institute, 1863, p. 330.



101. " 'BATTERY,' SMOKE PIPE AND DOORS FOR BOILERS." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 102

Title: "BOILER OF U.S. IRON CLAD STEAM BATTERY, MONITOR"

Date of Subject:

November 1-7, 1862

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

8 1/2 inches by 11 inches (est.)

Size [Sight]:

9 inches by 5 7/8 inches

Inscribed:

Title Block/Caption: "Longitudinal Section Through A B"
"Front Elevation"
"Half Section on EE. Half Section on CD."

Notes: "175 tubes¹, 2 1/4 outside diameter, 10' 2" long"

Rendered: early 1863 (est.)

Publication:

B. F. Isherwood, "Experiments Made with the Machinery of the U.S. Iron-Clad Steam Battery 'Monitor' ," *Experimental Researches in Steam Engineering*, Philadelphia: Hall of the Franklin Institute, Volume I, 2 volumes, 1863, plate XVI.

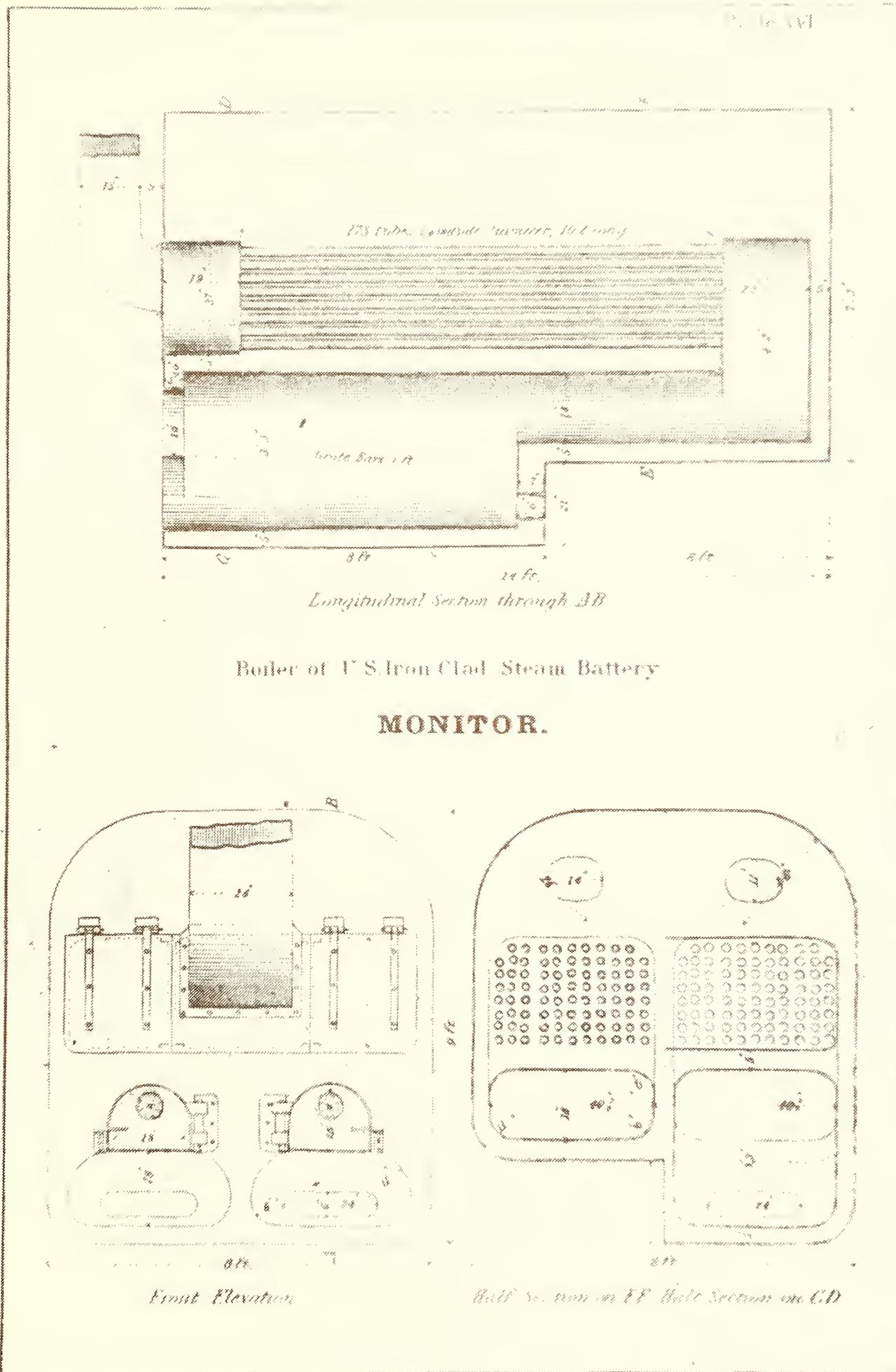
Remarks:

Commodore Isherwood, the Navy's chief of the Bureau of Steam Engineering, published a detailed account of the machinery and tests conducted on the *Monitor's* steam plant efficiency while the vessel was at the Washington Navy Yard for overhaul in November, 1862. In the plate accompanying the report, three views of the *Monitor's* boilers show the internal construction of the furnaces and the arrangement of the fire tubes. As a result of the 1862 tests, the two smoke pipe hatches were joined by a breeching and fitted with a telescoping, smokestack 31 1/2 inches "least" diameter and 33 feet above the grates. This would place the top of the stack approximately 24 feet 9 inches above the deck. The details of the front of the furnace doors are shown.

The 6-inch-by-24-inch opening in the back of the ash pit was intended for a blast pipe. The 11-inch-by-14-inch openings at the top of the boiler are the steam room man-holes at the back of the boiler. The hand-hole in the bottom of each water leg is not shown. None of the internal boiler stays are shown.

Footnotes:

¹ The number, 175, differs with the description. "Each furnace has 86 horizontal fire tubes, eleven rows horizontally, and eight vertically; the two upper corners omitted," for a total of 172 tubes in each boiler. Cf. *Isherwood*, *Ibid*.



102. "BOILER OF THE U.S. IRON CLAD STEAM BATTERY, MONITOR"
(Hall of the Franklin Institute)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 103

Title: "BOILERS (2) OF THE MONITOR, 1861"

Date of Subject:

1861

Draftsman/Life Dates:

Unknown

Medium: Photo-engraving

Size [Sheet]:

9 inches by 5 7/8 inches

Size [Sight]:

2 1/8 inches by 4 1/4 inches

Inscribed:

Title Block/Caption: See title.

Notes: See "Remarks"

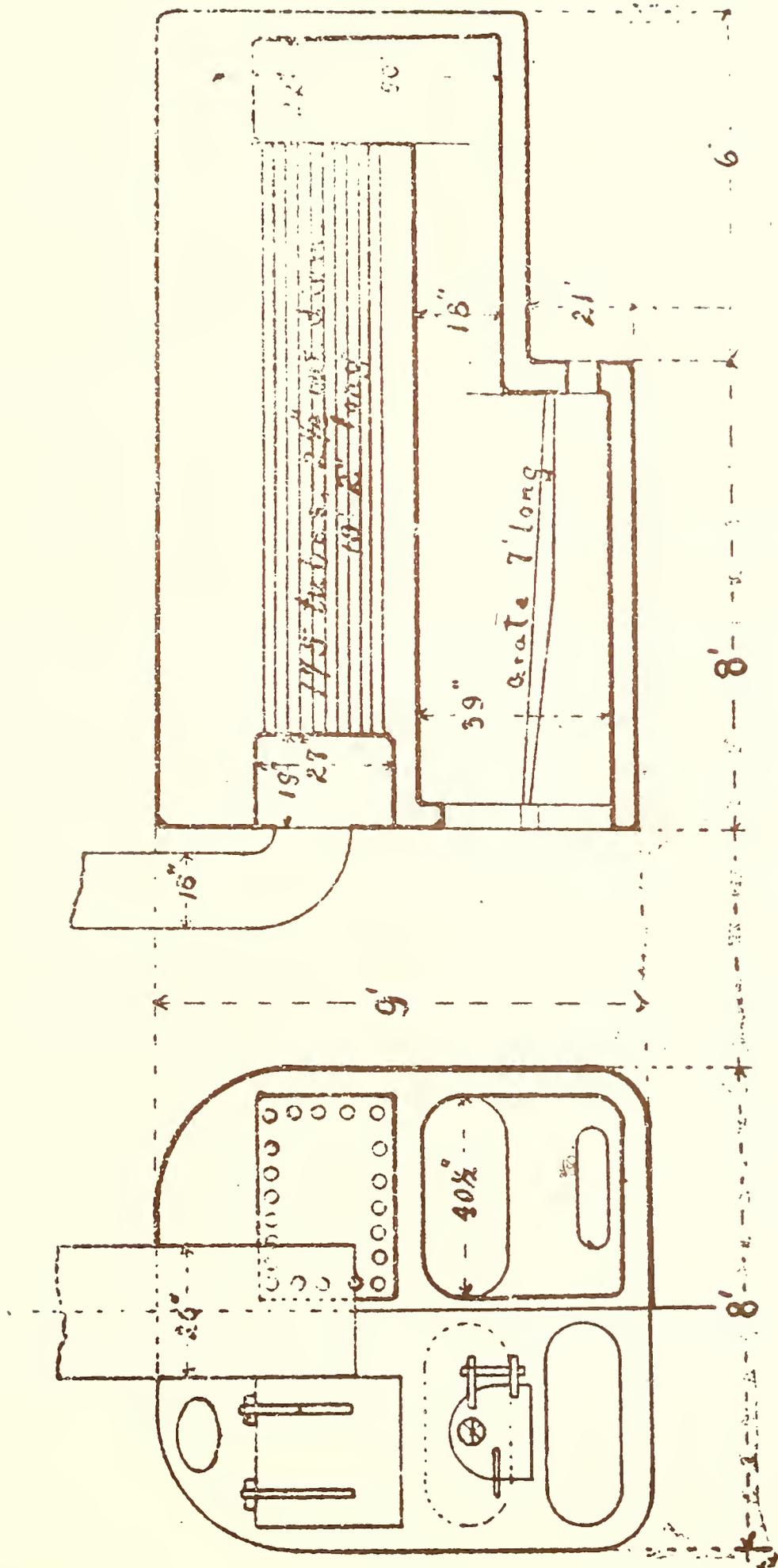
Rendered: ca. 1896 (est.)

Publication:

Frank M. Bennett, *The Steam Navy of the United States*, Pittsburgh: Warren and Company, 1896, p. 281.

Remarks:

This simplified drawing of the *Monitor's* boiler carries three errors: (1) the height of the back of the boiler is 5 feet 3 inches instead of 7 feet 3 inches; (2) the number of fire tubes is 175 instead of 172; and (3) a fire tube is indicated in each of the upper corners of the tube plate.



103. "BOILERS (2) OF THE MONITOR, 1861" (Warren and Company)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 104

Title: Steam and Discharge Pipes, Steam Stop and Safety Valves

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper

Size [Sheet]:

22 1/2 inches by 28 inches (est.)

Size [Sight]:

22 1/2 inches by 26 1/2 inches (est.)

Inscribed:

Scale: Assumed to be 3 inches = 1 foot

Notes:

"To Turret Engine" [Steam pipe running forward]

"Internal Steam Pipe to be furnished with 12 holes 1 1/2 inch diameter & 12 do. [holes] 1 1/4 inch diameter placed on the top side."

Signature/Initials: "Monitor/Capt. E" [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. November 1861 (est.)

Original:

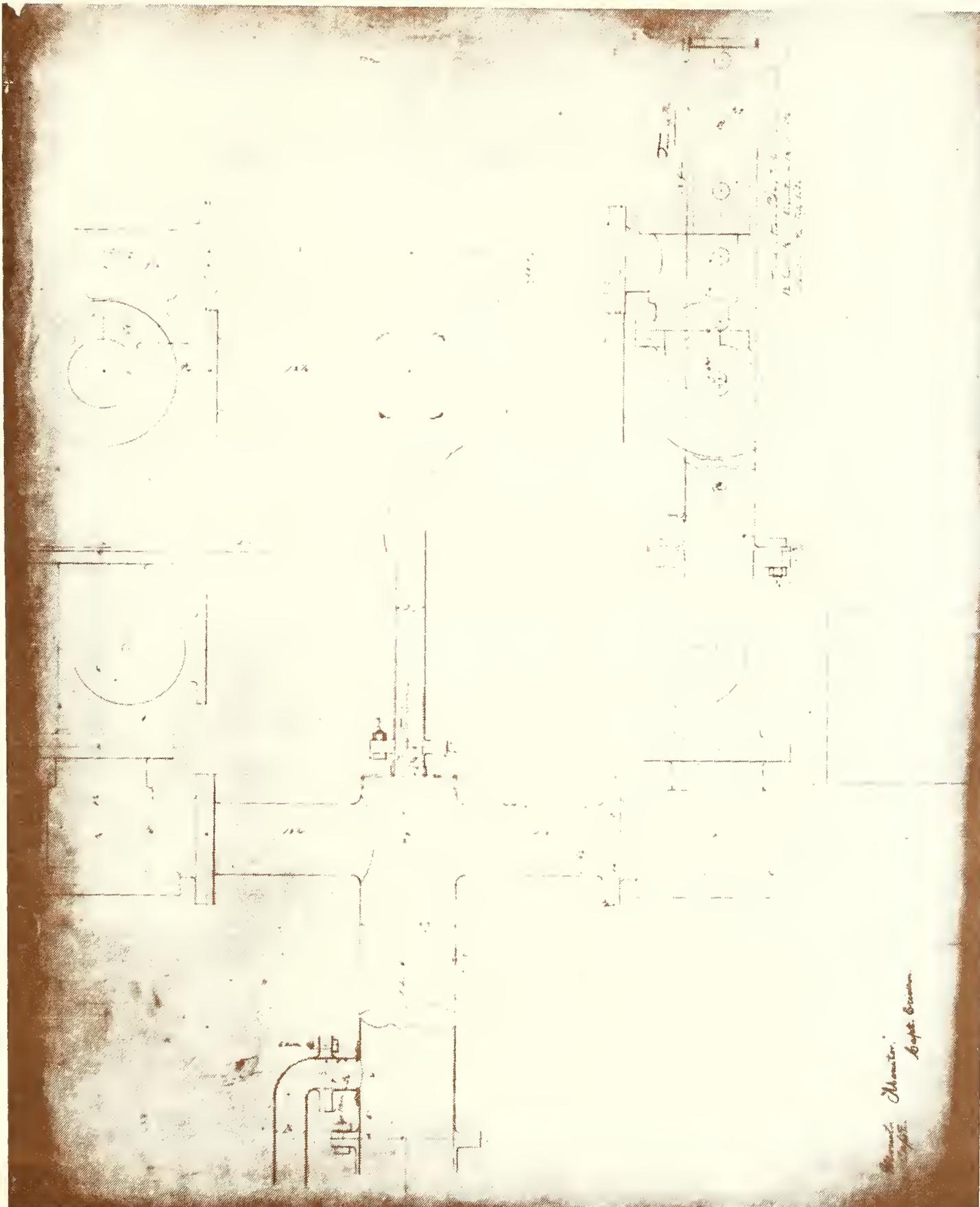
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 28(130)

Condition: Good

Remarks:

This rough drawing shows plan and end views of the connection of (1) the steam stop valve to the port and starboard boilers, their internal steam pipes, and the main steam pipe to the main, blower, pump, and turret engines; (2) the safety valves; and (3) the discharge or waste steam pipe. Sectional views of two deck beams and an uptake are shown in relation to the piping.



104. Steam and Discharge Pipes, Steam Stop and Safety Valve (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 105

Title: " 'BATTERY.' STEAM AND DISCHARGE PIPES, STEAM STOP VALVES AND SAFETY VALVES"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue and red ink on paper.

Size [Sheet]:

27 inches by 23 1/2 inches (est.)

Size [Sight]:

26 1/2 inches by 20 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"Note. Internal Steam Pipe to be perforated with 12 holes 1 1/4" diam. and 12 holes 1 1/2" diam., placed on the top side."

Signature/Initials: " 'Monitor' / C.W.M."

Rendered: ca. November 1861 (est.)

Original:

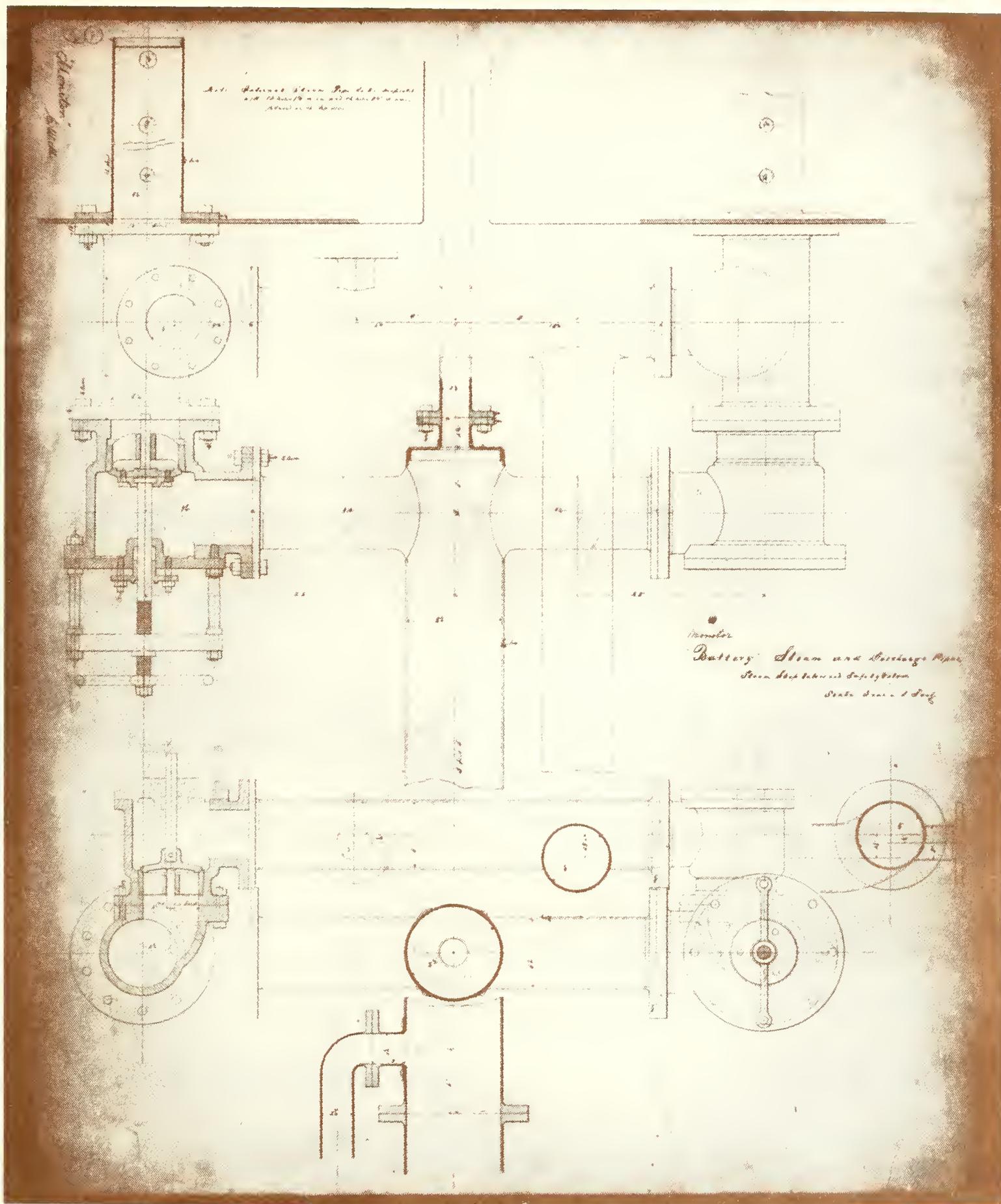
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 16(124)

Condition: Excellent

Remarks:

This drawing shows the top and front view of the steam and discharge pipes leaving and entering the boiler fronts. Transverse sections show the internal construction of the steam stop valve and the safety valve. The safety valve appears to be 5 inches in diameter, and the stem operates as a fulcrum on a pivoted lever of 4 inches. The steam lines to the turret engines and the pump and blower engines are also indicated.



105. " 'BATTERY.' STEAM AND DISCHARGE PIPES, STEAM STOP VALVES AND SAFETY VALVES" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 106

Title: "BATTERY. SAFETY VALVE WEIGHTS"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

15 inches by 19 1/2 inches (est.)

Size [Sight]:

14 1/4 inches by 18 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Assumed to be full

Notes:

"Two of this"

"Wrought iron [pivot]/Lead weight/8 inches cube"

Signature/Initials: "Monitor/Capt. E" [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. November 1861 (est.)

Original:

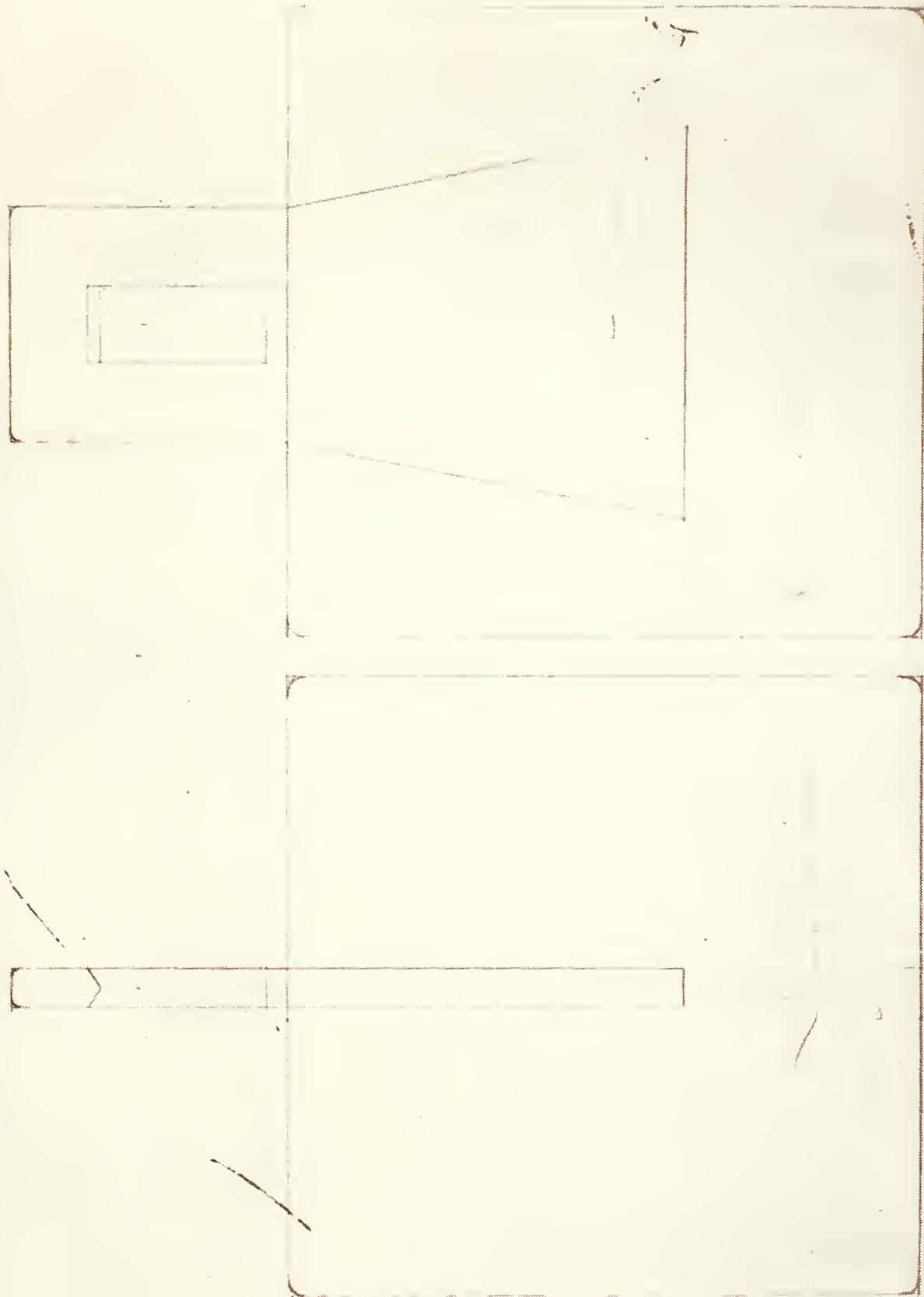
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 35(105)

Condition: Excellent

Remarks:

The 210-pound lead weight shown in the drawing was used to establish the relief pressure of the boiler safety valve. Assuming the maximum pressure allowable to be 40 p.s.i. and a safety-valve lever system of Catalog Drawing 105, the weight should be suspended on a lever of about 15 1/2 inches from the center of the safety valve.



Prof. John W. ...
 Monitor.
 Capt. E. ...
 (25)

106. "BATTERY. SAFETY VALVE WEIGHTS" (Stevens Institute of Technology)

MAIN ENGINE, SHAFTING AND PROPELLER

Numbers 107-132

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 107

Title: Ericsson Vibrating Lever Engine of *Judith*

Date of Subject:

Prior to 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Ink and pencil on paper.

Size [Sheet]:

13 1/4 inches by 21 1/2 inches (est.)

Size [Sight]:

9 1/4 inches by 21 inches

Inscribed:

Scale: Not specified, assumed, 1 inch = 1 foot

Notes:

"This drawing made by Capt. Ericsson. Statement by C. W. M. [Charles W. MacCord] Oct. 8 '08. 'Not for Monitor.' Written by F. DeR. F." [Franklin DeR. Furman] [Pencil]

Signature/Initials: "Judith/Capt. Ericsson [Ink] (Written by C.W.M., Dec. 1912-Jan. 1913)" [Pencil]

Rendered: Prior to 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 78(139)

Condition: Poor, edges broken, wrinkled.

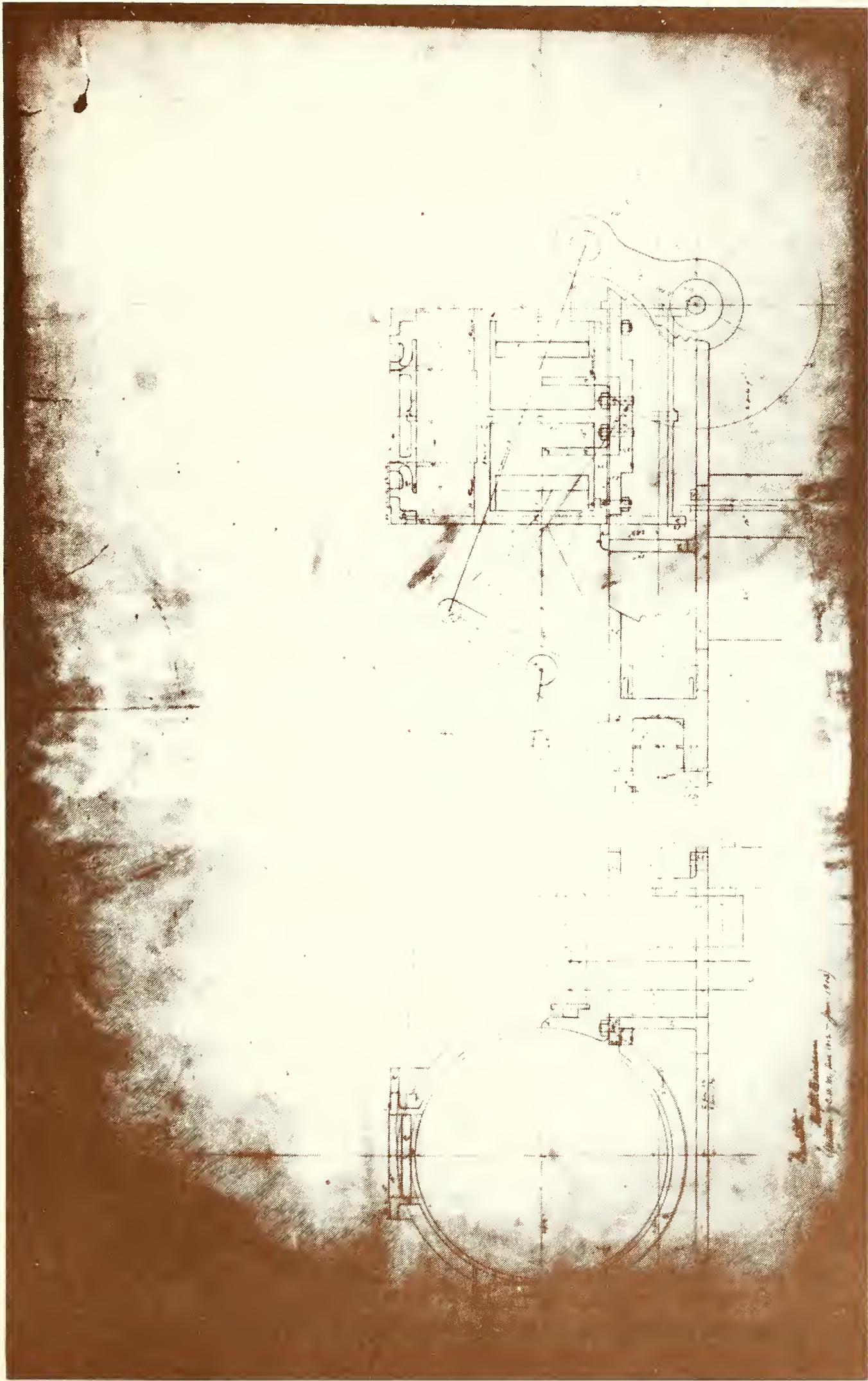
Remarks:

This engine was apparently drawn for the ship *Judith*, a privateer schooner,¹ and is similar to Ericsson Patent No. 20782 of 6 July, 1858. The schematic motion of the links indicates a connecting rod between the end of the piston rod and the engine link to the rock shaft. This engine is not the *Monitor* engine but a close predecessor. A cross section of the steam chest is shown.

Franklin DeR. Furman was professor of mechanism and machine design at the Stevens Institute of Technology and wrote MacCord's obituary for the *Stevens Indicator* of April, 1915.

Footnote:

¹ Cf. *The Official Records of the Union and Confederate Navies in the War of the Rebellion*, 2nd series, Vol. 1, Washington: 1894-1922.



107. Ericsson's Vibrating Lever Engine of Judith (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 108

Title: "ENGINE OF 'DAYLIGHT' MODIFIED FOR 'MONITOR' "

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

16 1/2 inches by 24 3/8 inches (est.)

Size [Sight]:

15 1/2 inches by 23 1/2 inches

Inscribed:

Title Block/Caption: "DAYLIGHT"

Scale: "1 inch = one foot"

Notes:

"Not Monitor./Engine of 'Daylight' modified for Monitor./[altering?] pattern."
[Pencil]

Signature/Initials: "Made by Capt. E." [Pencil]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 73(126)

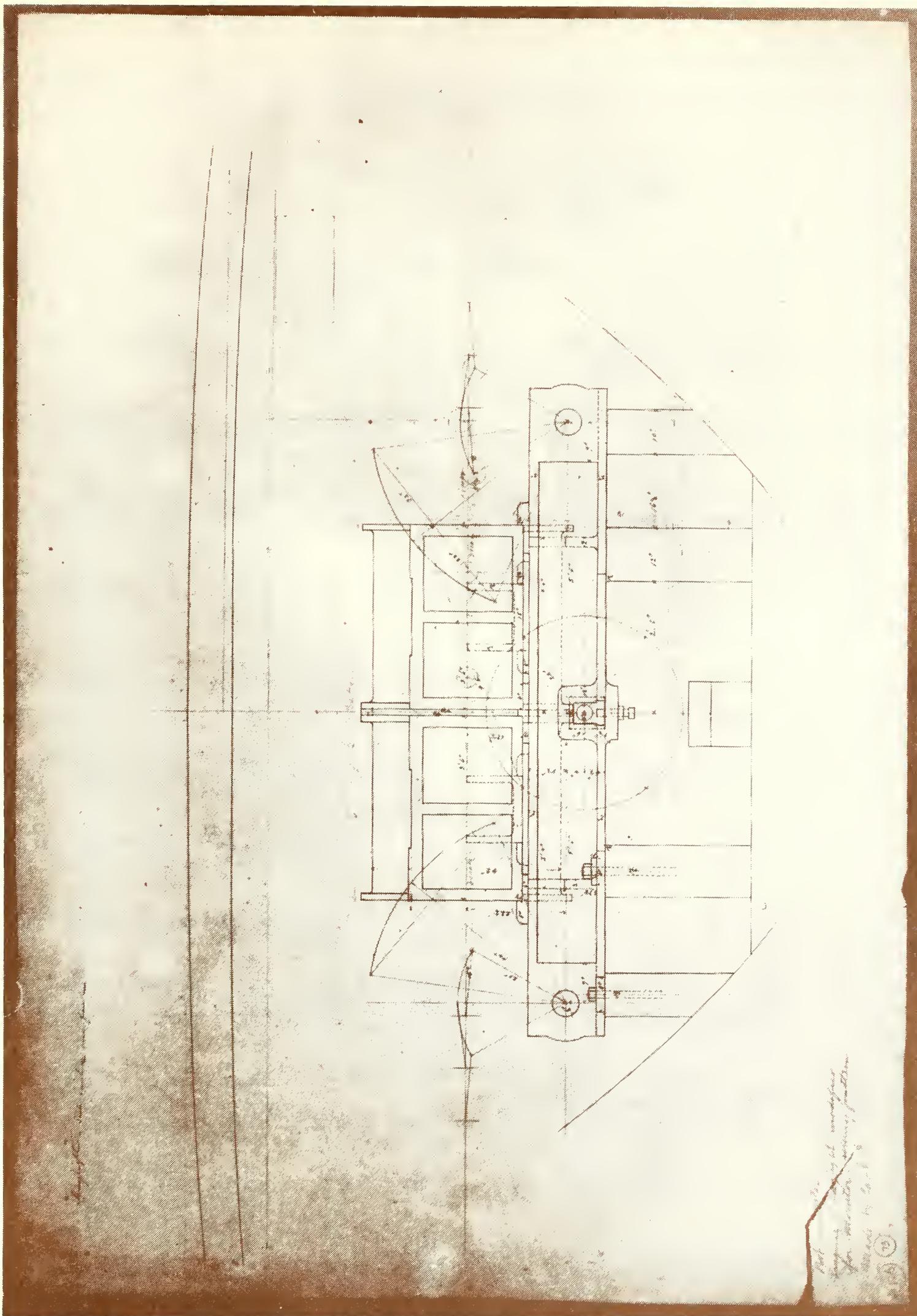
Condition: Excellent

Remarks:

A pencil notation of the length of the two cylinders for the "Battery" reduces the dimensions from 7 feet 1 1/2 inches to 6 feet by 11 1/2 inches or from 85 1/2 inches to 83 1/2 inches. A faint diagonal line parallel to the sloping side of the "Daylight" is annotated with what appears to be "No. 31," which corresponds to the number of the frame supporting the forward engine bulkhead of the *Monitor*. The other dimension modifications are for the links. The motion diagram of the links indicated that this engine still has a fixed piston rod and is not a true representation of the *Monitor* engine. The *Daylight* was a screw steamer built in 1859 by Samuel Sneden of New York; it was commissioned as the U.S.S. *Daylight* in June 1861¹. Sneden had been a business associate of Thomas F. Rowland in the period before the building of the *Monitor*.

Footnotes:

¹ U.S. Navy Department, *Dictionary of American Fighting Ships*, Vol. II, Washington: Government Printing Office, 1963, p. 247.



Not to be used for any other purpose than for the monitor. Stevens Institute of Technology. 1862.

108. "ENGINE OF 'DAYLIGHT' MODIFIED FOR THE 'MONITOR' "
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 109

Title: An Ericsson Vibrating Lever Engine

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

26 1/4 inches by 34 1/2 inches

Size [Sight]:

23 1/2 inches by 31 1/2 inches

Inscribed:

Signature/Initials: "Monitor./Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson." [Ink]

Rendered: ca. October 1861

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 38(124)

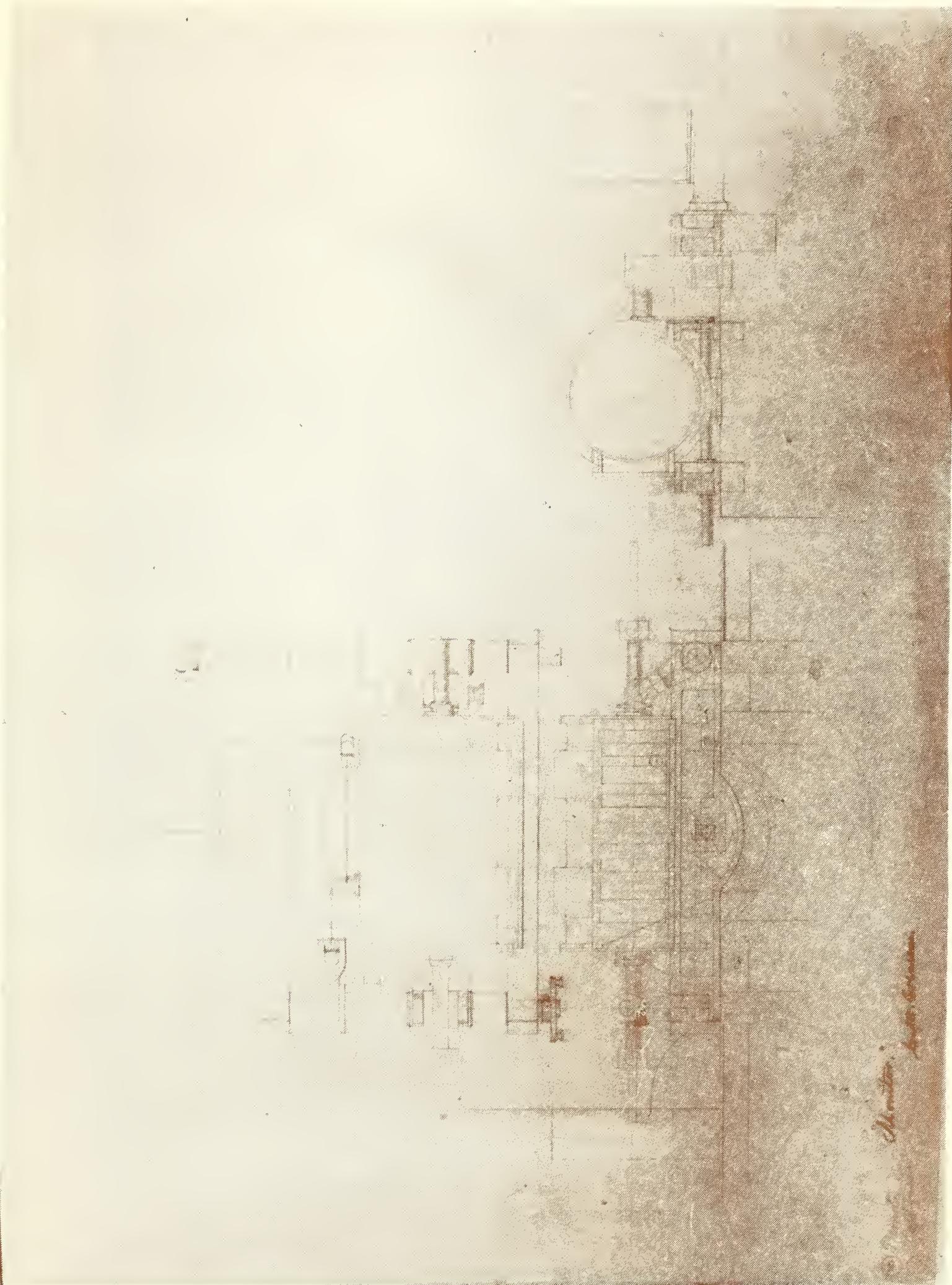
Condition: Excellent

Remarks:

The engine shown in the drawing is similar to the *Monitor* despite the annotations. The engine has a fixed piston rod with a crosshead working on horizontal slides, which is not in accord with Isherwood's detailed description.¹

Footnotes:

¹ Chief Engineer B.F. Isherwood, USN, *Experimental Researches in Steam Engineering*, Philadelphia: Hall of the Franklin Institute, 1863, p. 328.



109. An Ericsson Vibrating Lever Engine (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 110

Title: Main Cylinder of *Monitor* Engine

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and red ink and pencil on paper.

Size [Sheet]:

13 3/4 inches by 22 1/4 inches

Size [Sight]:

12 1/2 inches by 21 inches

Inscribed:

Scale: Assumed to be 1 inch = 1 1/2 feet

Notes:

"Main Cylinder of Monitor" [Pencil]

"Made by Capt. Ericsson." [Deleted in pencil]

" 'Monitor' / C.W. MacCord" [Ink]

Rendered: ca. October 1861 (est.)

Original:

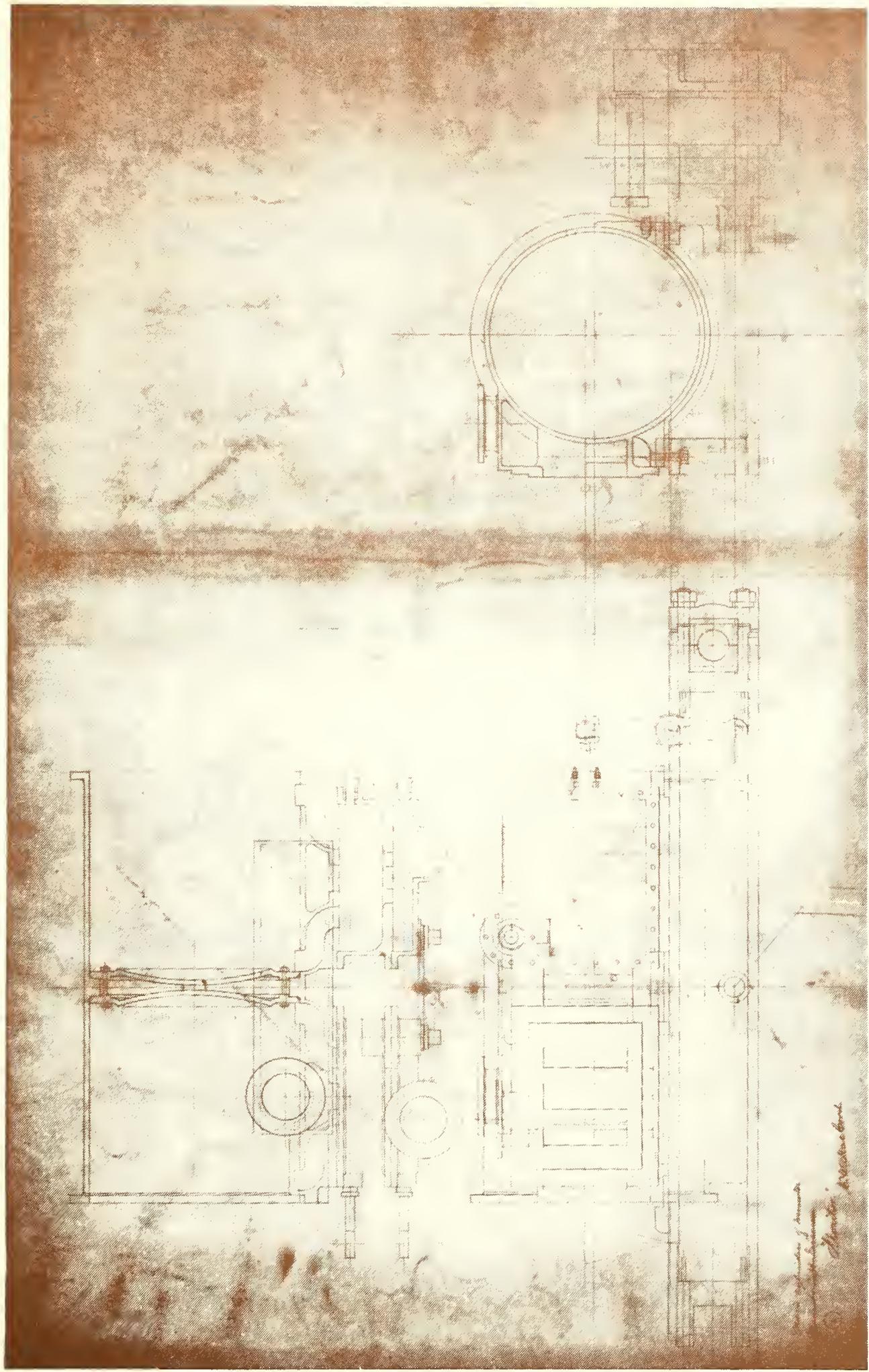
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 1(137)

Condition: Good

Remarks:

This is the only and most complete drawing of the *Monitor* engine in the MacCord Collection except for the views shown in Catalog Drawing 13. The top, front, and end views emphasize the valve chest, links, and the propeller crank. Pencil sketches of all three views show planning for the starting gear, the injection gear, and the "full stroke" lever. Red lines mark the center lines for steam pipes, valve rods, and links.



110. Main Cylinder of Monitor Engine (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 111

Title: Transverse Section Through the Center of the Main Engine Cylinder

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

2 1/4 inches by 5 3/4 inches

Size [Sight]:

2 1/4 inches by 3 3/4 inches

Inscribed:

Title Block/Caption: "Bottom illustration is a cross-section of the engine cylinders."

Rendered: ca. 1876 (est.)

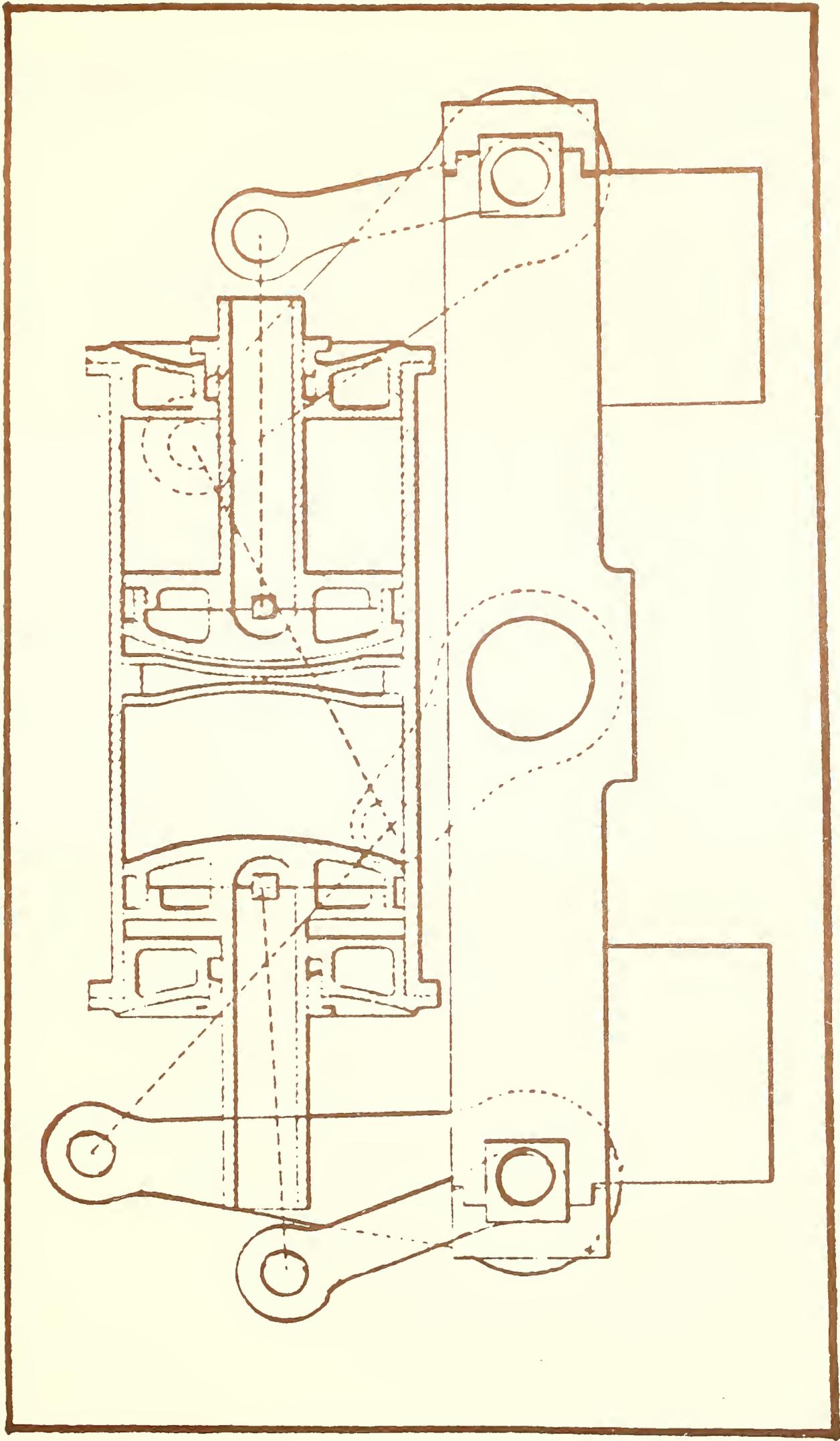
Publication:

George Allenson, "The Monitor," *Model Craftsman*, (February, 1937), p. 10.

F. M. Bennett, "The United States Ironclad 'Monitor'," *Cassier's Magazine*, XIII, (April, 1898), No. 6, p. 467.

Remarks:

The drawing gives a view of the construction of the *Monitor's* pistons and the internal "half-trunk" configuration. The drawing also shows the extreme positions of the pistons when the stroke of one is beginning and the other is ending.



111. Transverse Section Through The Center Of The Main Engine Cylinder (Model Craftsman)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 112

Title: Section of the Cylinders

Date of Subject:

ca. 1862 (est.)

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 3/4 inches by 7 3/4 inches

Size [Sight]:

1 7/8 inches by 3 3/4 inches (est.)

Inscribed:

Notes: "See Chapter XXXIV"

Rendered: ca. 1876 (est.)

Publication:

John Ericsson, *Contributions to the Centennial Exhibition*, New York: "Nation" Press, 1876, p. 487.

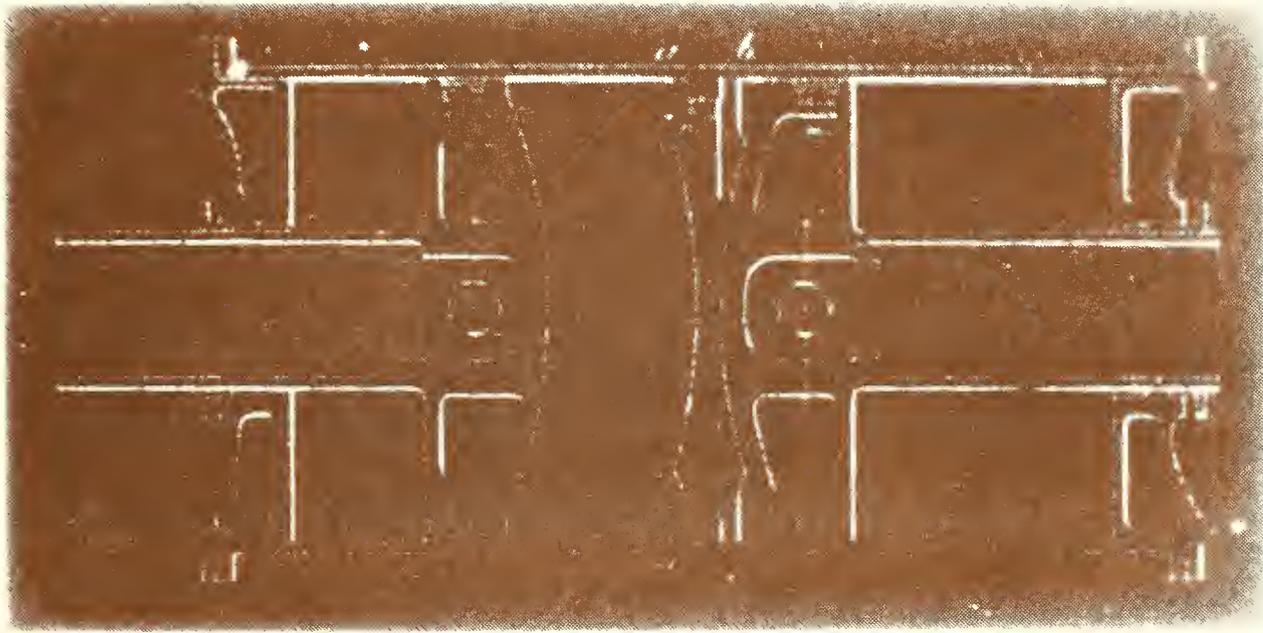
John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 8.

Remarks:

This diagram was used by Ericsson to refute comments made by Isherwood¹ regarding certain thermodynamic losses in engines of this configuration as a result of the proximity of the opposed cylinders.

Footnotes:

¹ B. F. Isherwood, *Researches in Steam Engineering*, Philadelphia: Hall of the Franklin Institute, 2 volumes, 1863, p. 339.



112. Section of the Cylinders ("Nation" Press)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 113

Title: "THE MONITOR ENGINE/DESIGNED BY JOHN ERICSSON. BUILT AT NUMEROUS ESTABLISHMENTS, 1862/FRONT ELEVATION"

Date of Subject:

ca. 1862 (est.)

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 3/4 inches by 7 3/4 inches

Size [Sight]:

4 inches by 6 1/8 inches

Inscribed:

Notes: "See Chapter XXXIV"

Rendered: ca. 1876 (est.)

Publication:

John Ericsson, *Contribution to the Centennial Exhibition*, New York: "Nation" Press, 1876, Plate 51.

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 8.

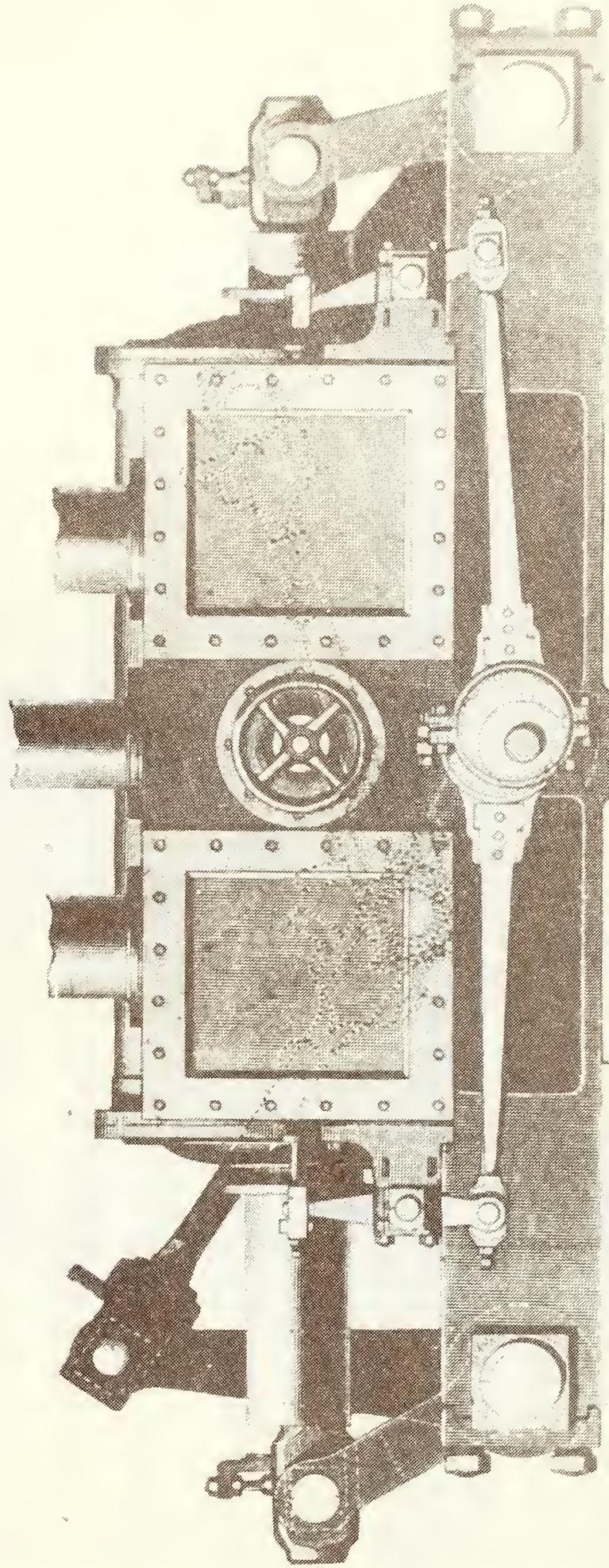
Remarks:

The engraving shows the front view looking aft of a typical, half-trunk Ericsson vibrating-lever engine similar to the one installed on the *Monitor*. This engine had an integral throttle control whereas the *Monitor's* was external. The eccentric motion for the valve gear of the *Monitor* was transmitted by rods rather than by beams, as shown on this drawing.

The Monitor Engine

DESIGNED BY JOHN ERICSSON. BUILT AT NUMEROUS ESTABLISHMENTS

FRONT ELEVATION



113. "THE MONITOR ENGINE/DESIGNED BY JOHN ERICSSON. BUILT AT NUMEROUS ESTABLISHMENTS, 1862/Front Elevation" ("Nation" Press)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 114

Title: "THE MONITOR ENGINE/DESIGNED BY JOHN ERICSSON. BUILT AT NUMEROUS ESTABLISHMENTS, 1862/TOP VIEW."

Date of Subject:

1862 (est.)

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 3/4 inches by 7 3/4 inches

Size [Sight]:

4 7/8 inches by 5 7/8 inches

Inscribed:

Title Block/Caption: See title.

Notes: "See Chapter XXXIV"

Rendered: ca. 1876 (est.)

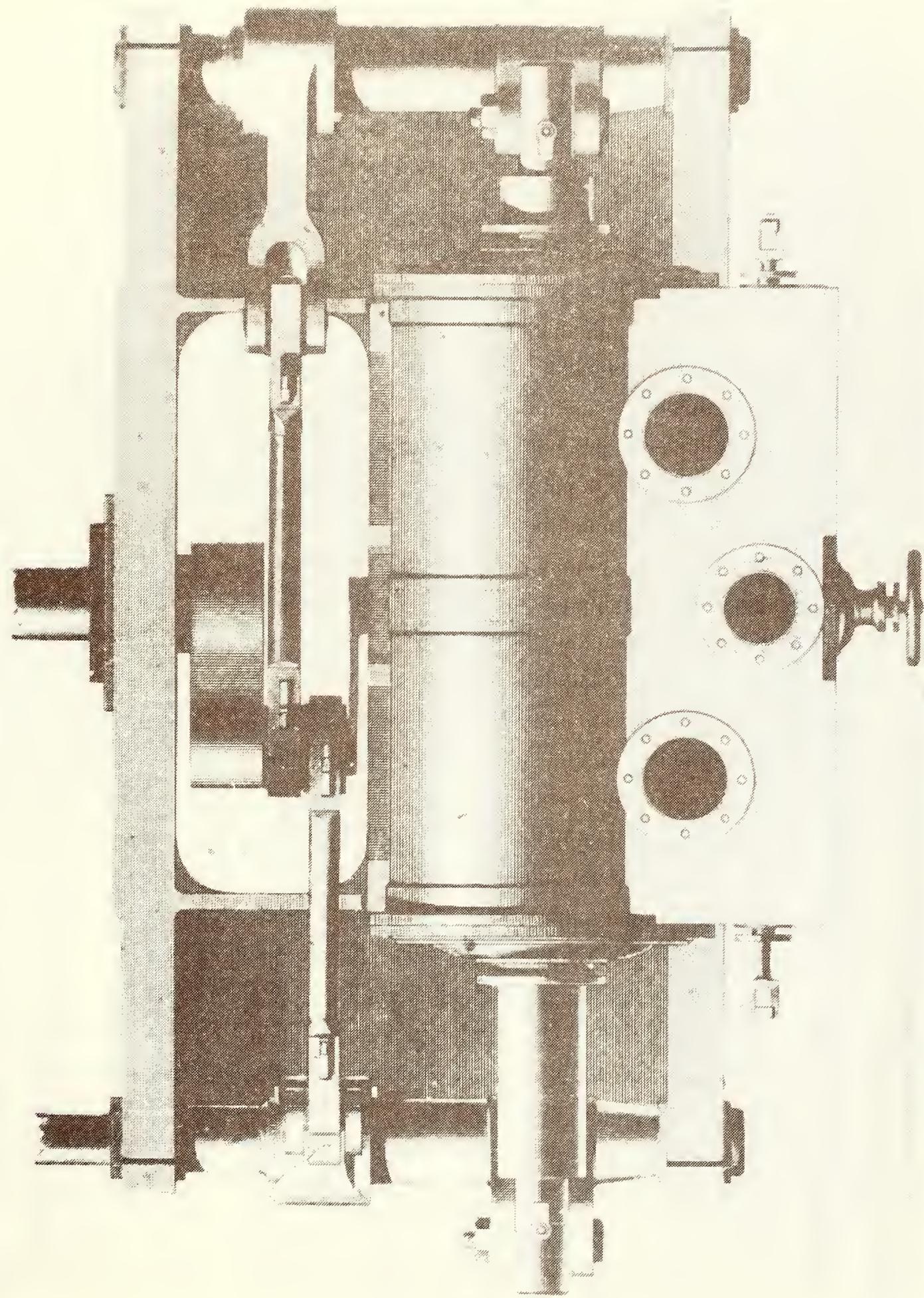
Publication:

John Ericsson, *Contributions to the Centennial Exhibition*, New York: "Nation" Press, 1876, plate 50.

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publication, Inc., 1970, reel 8.

Remarks:

Although the engine is not identical to the engine of the *Monitor*, it is similar. Where the *Monitor* engine had slide and cutoff valves in the steam chest, this engine shows slide valves only. The most unique feature of this drawing is that it shows clearly the eccentric shaft crank, attached to the forward side of the propeller crank pin to drive the valve eccentric. Details of this crank are shown in Catalog Drawing 124.



114. "THE MONITOR ENGINE. DESIGNED BY JOHN ERICSSON. BUILT AT NUMEROUS ESTABLISHMENTS, 1862/TOP VIEW." ("Nation" Press)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 115

Title: Longitudinal Section of the Main Engine, Starting and Reversing Gear, and Valve Levers

Date of Subject:
ca. October 1861 (est.)

Draftsman/Life Dates:
John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:
21 inches by 28 inches (est.)

Size [Sight]:
20 inches by 27 1/4 inches (est.)

Inscribed:

Title Block/Caption: "BATTERY ENGINE"

Scale: 3 inches = 1 foot (est.)

Notes:

"Section of Cylinder of Monitor/Made by Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]
"Top of Condenser" [Pencil]

Signature/Initials: See notes

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 2(124)

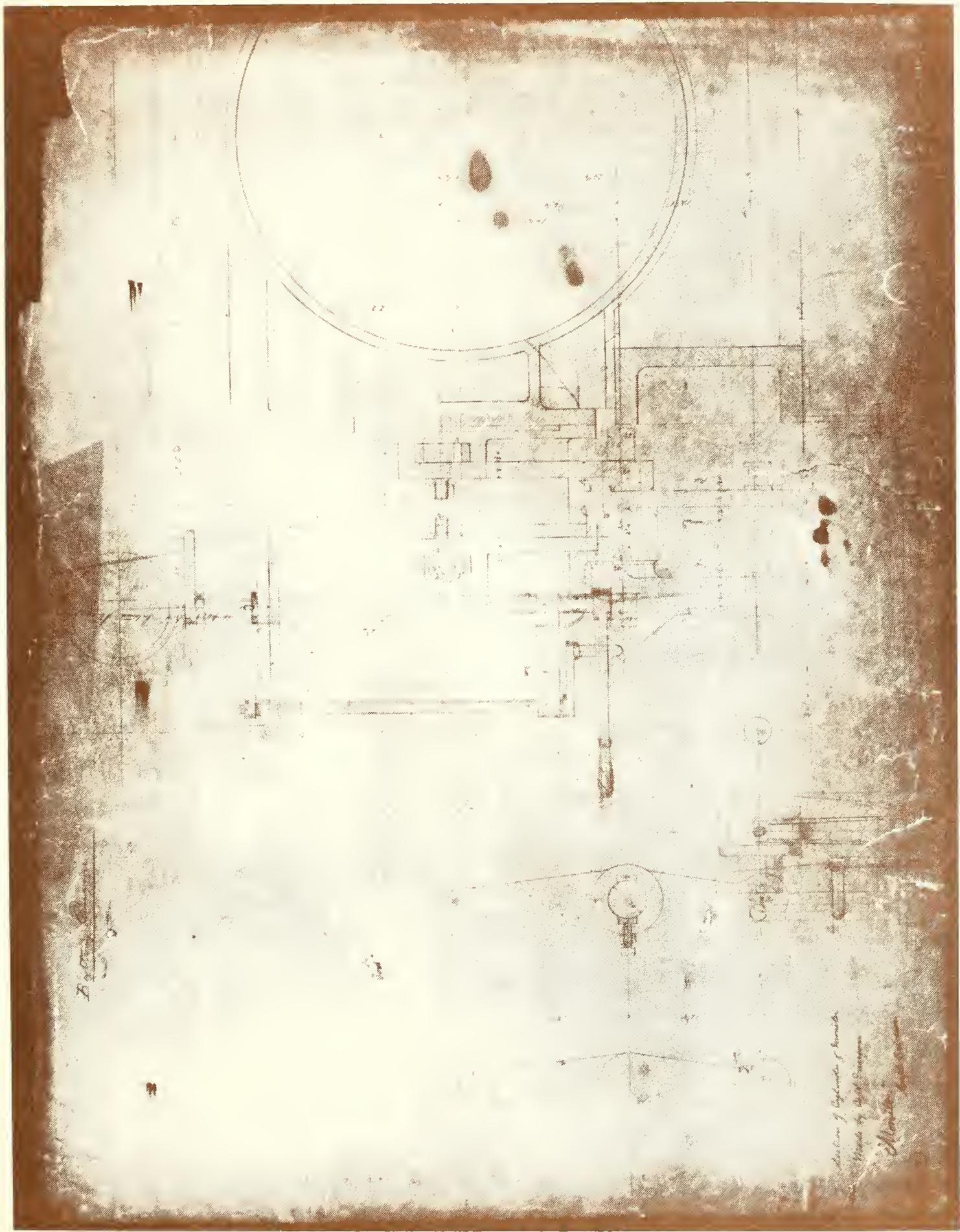
Condition: Poor, edges broken, spotted.

Remarks:

The longitudinal cross section of the main engine's valve chest and cylinder shows the throttle crank, lead screw, and bracket; a lever-and-rod linkage mounted on the engine centerline that controlled the injection cock on the condenser; the handcrank that rotates the reversing eccentrics; and the main cutoff valve levers. Photographs of the *Monitor's* wreck made in 1979 reveal that this reversing eccentric gear was operated by a six-spoked wheel¹.

Footnotes:

¹ Gordon P. Watts, Jr., *Investigating the Remains of the U.S.S. Monitor*, Raleigh: North Carolina Department of Cultural Resources, 1982.



115. Longitudinal Section of the Main Engine, Starting and Reversing Gear, and Valve Levers
(Stevens Institute of Technology.)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 116

Title: "BATTERY: STARTING GEAR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

19 1/2 inches by 24 inches (est.)

Size [Sight]:

18 inches by 22 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes:

"Wrought Iron — All Polished"

"5 Threads to the inch" [Crank rod, Pencil]

Signature/Initials: " 'Monitor'/Main Engine/Starting Gear/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 52A(124)

Condition: Poor, edges broken, heavily spotted.

Remarks:

This rough drawing shows the throttle controls for the main engine and includes the throttle crank, screw shaft, and travelling nut, and the upper and lower screw shaft brackets. The travelling nut operates a vertical rod that controls the position of the grid iron plate in the main steam line. A large hole at the intersection of the arms of the lower bracket acts as a guide for a vertical rod that may control, through a series of cranks and links, the operation of the condensor injection cock (see Catalog Drawing 137).



116. "BATTERY: STARTING GEAR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 117

Title: "BATTERY: THROTTLE VALVE AND SLIP JOINT"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and red ink on paper.

Size [Sheet]:

19 inches by 24 inches (est.)

Size [Sight]:

17 1/2 inches by 21 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor'/C.W.M." [Ink]

Rendered: ca. November 1861 (est.)

Original:

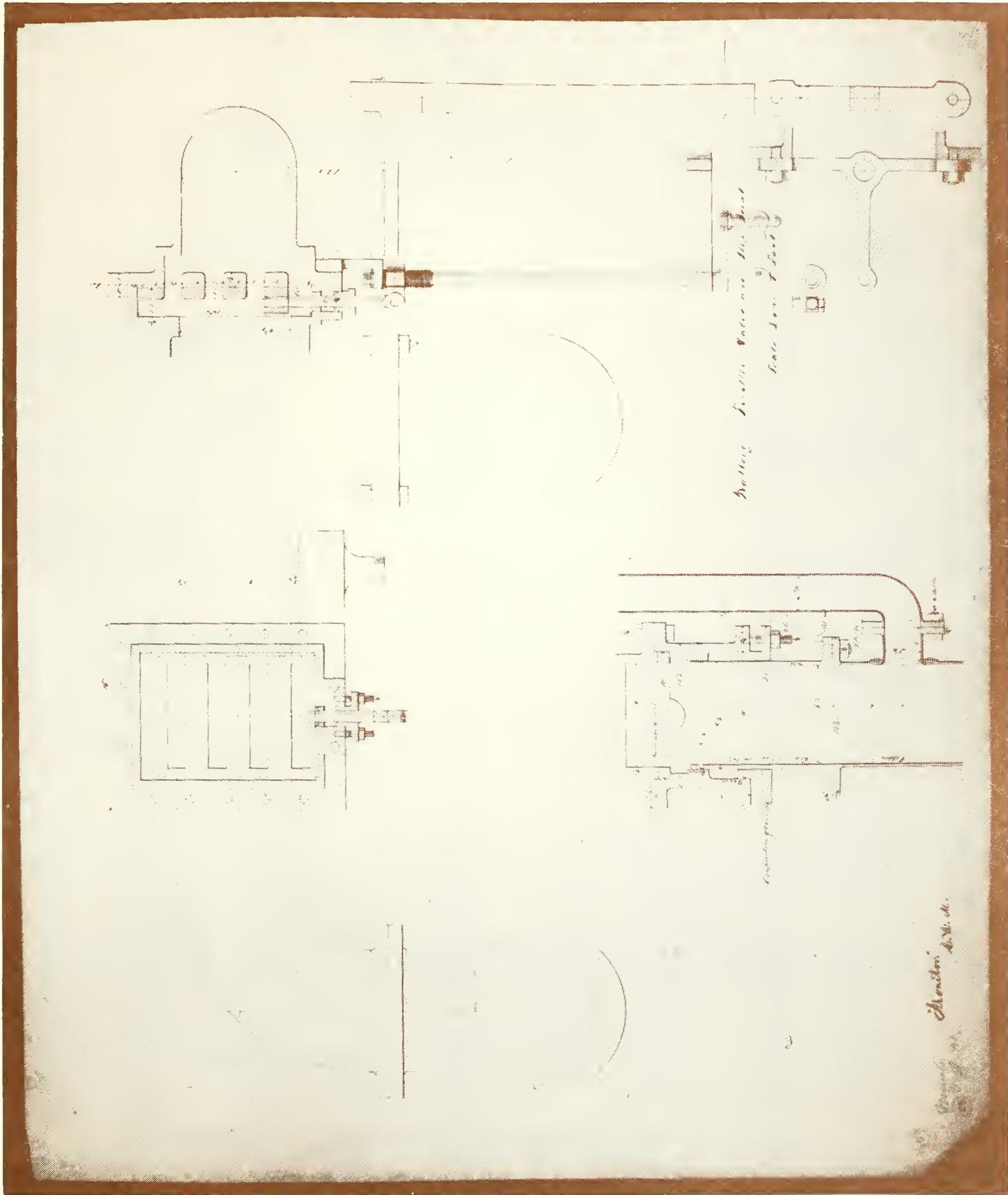
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 29(103)

Condition: Excellent

Remarks:

This finished drawing shows longitudinal and transverse sections of the "gridiron" throttle valve in the main steam line and a longitudinal section of the connection between the end of the main steam line and the throttle valve. The auxiliary steam pump steam line is shown in the longitudinal section. The main and auxiliary steam lines are indicated as copper and the gland as composition metal [brass]. The valve stem drops 1 1/2 inches by seven turns of the crank to cut off the steam to the main engine.



117. "BATTERY: THROTTLE VALVE AND SLIP JOINT" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 118

Title: "BATTERY ENGINE. MAIN ROCK SHAFTS AND LEVERS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Ink on paper.

Size [Sheet]:

19 1/8 inches by 27 inches (est.)

Size [Sight]:

15 3/4 inches by 22 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Notes:

"Starboard Rock Shaft"

"Larboard Rock Shaft"

"Wrought Iron. Polished" [Both shafts and levers]

"d. Steel Pin" [Air Pump lever pin]

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor' /C. W. MacCord" [Ink]

Rendered: ca. November 1861 (est.)

Original:

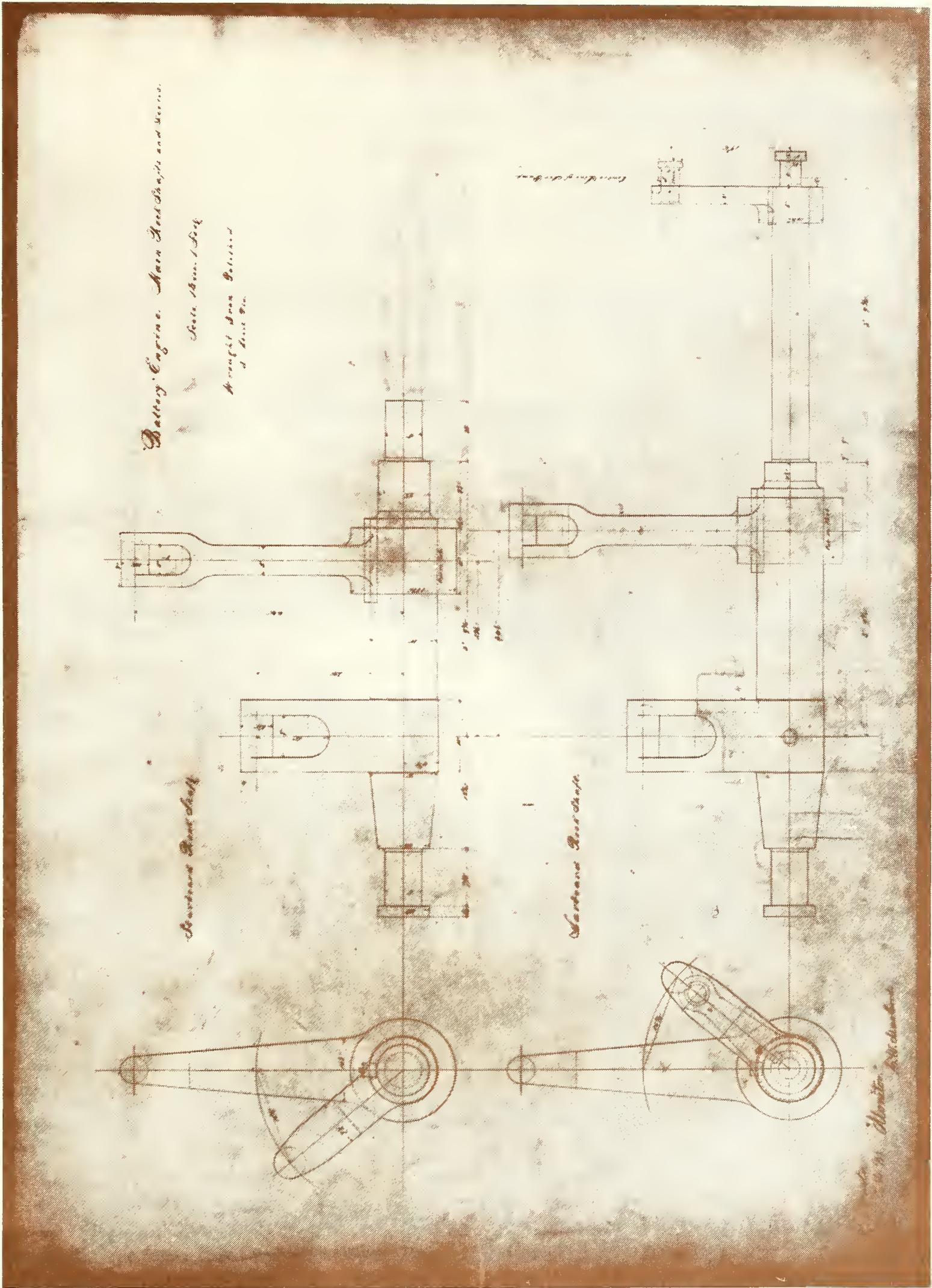
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 50C(116)

Condition: Excellent

Remarks:

This drawing shows the "larboard" [port] and starboard rock shafts and the levers for the main engine. The "vibrating levers" are the salient features of the Ericsson engine, transmitting the oscillatory motion of the opposed pistons into direct-acting, circular motion to the propeller shaft. The port rock shaft is extended aft to support a lever that drives the condenser air pump.



118. "BATTERY ENGINE. MAIN ROCK SHAFTS AND LEVERS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 119

Title: "BATTERY ENGINE. MAIN LINKS AND CONNECTING RODS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and blue ink on paper.

Size [Sheet]:

16 1/4 inches by 22 inches

Size [Sight]:

15 1/4 inches by 19 3/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"Two of Each. Finished" [Links and Connecting Rods]
"c. Composition Metal" [Bearing pillow blocks]

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

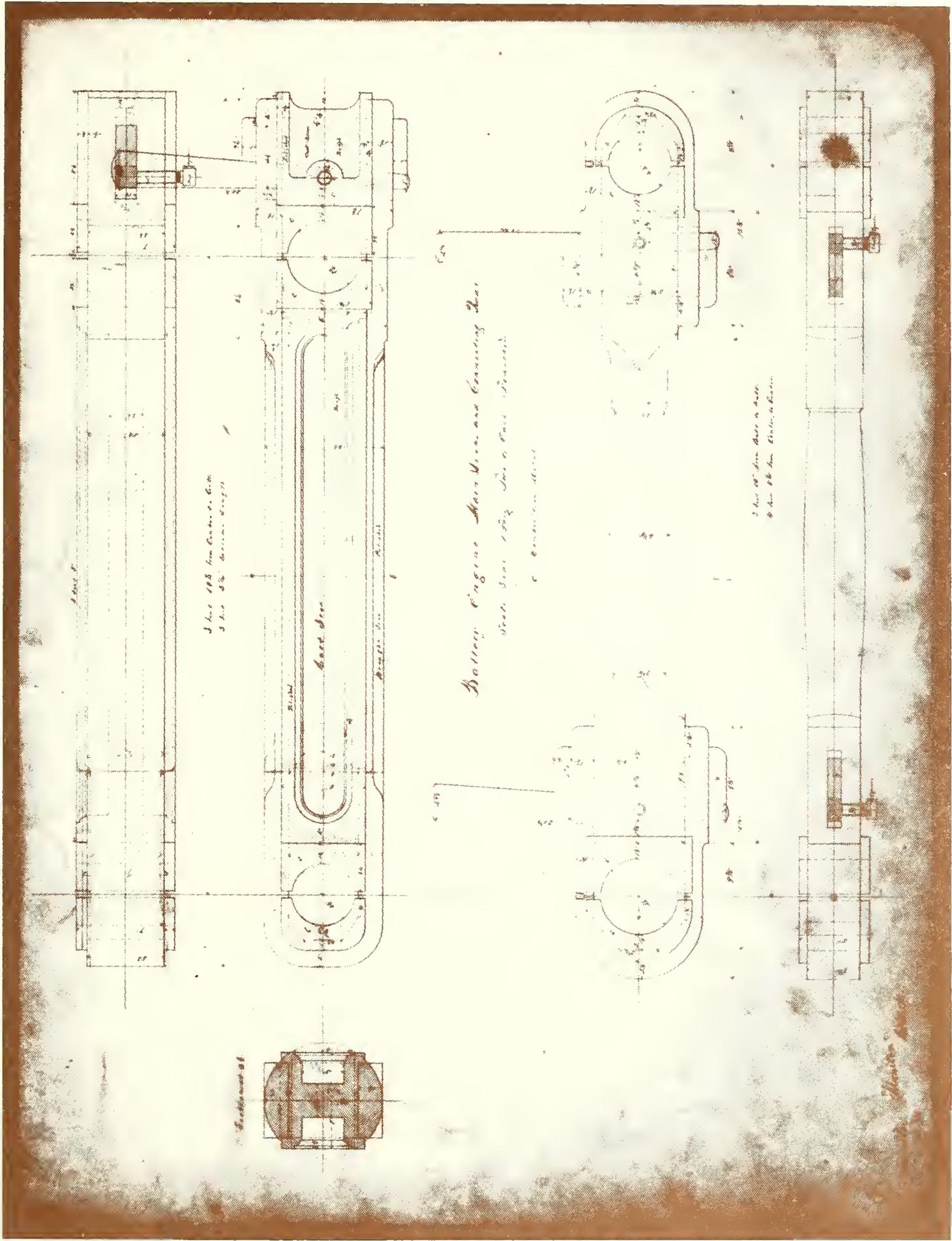
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 50B

Condition: Excellent, some spotting.

Remarks:

This drawing shows the main link that connects the piston to the forward lever of the rock shaft and the connecting rod that connects the after rock shaft levers to the main crank of the propeller shaft. The ends of the links and rods are equipped with brass bearings, straps, and keys for taking up the wear. The connecting rod has screw fittings for oil cups. Two oil cups are shown on the rock shaft end of the main link on the U.S.S. *Tecumseh* drawings, one to lubricate the bearings on the rock shaft lever, and the other, to lubricate, through a duct, the piston pin bearing. The *Monitor* probably had the same arrangement.



119. "BATTERY ENGINE. MAIN LINKS AND CONNECTING RODS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 120

Title: "BATTERY ENGINE. SKELETON — FRONT VIEW"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on buff paper.

Size [Sheet]:

18 3/4 inches by 27 3/4 inches (est.)

Size [Sight]:

17 1/2 inches by 27 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes: "Port Engine"

Signature/Initials: "Made by Capt. Ericsson" [Pencil and deleted]
" 'Monitor'/C. W. M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 26(126)

Condition: Excellent

Remarks:

The drawings show the relative motion of the piston pin, main link, rock shaft, air pump link, and the main crank of the port engine looking aft. The diagram also shows the positions of the port and starboard main eccentric, the port and starboard cutoff eccentric, and the main crank when the starboard piston is "full in" the cylinder.



120. "BATTERY ENGINE. SKELETON — FRONT VIEW" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 121

Title: "BATTERY ENGINE CUT-OFF VALVE MOVEMENT"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on buff paper.

Size [Sheet]:

18 3/4 inches by 27 5/8 inches (est.)

Size [Sight]:

16 inches by 27 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "Full Size" [Movements]
"3 ins. = 1 Foot" [Cut-off valves]

Notes: "Starboard Engine"

Signature/Initials: "Monitor/C.W.M.?" [Pencil]
" 'Monitor'/Cut-off Valve Movement/C.W.M." [ink]

Rendered: ca. October 1861 (est.)

Original:

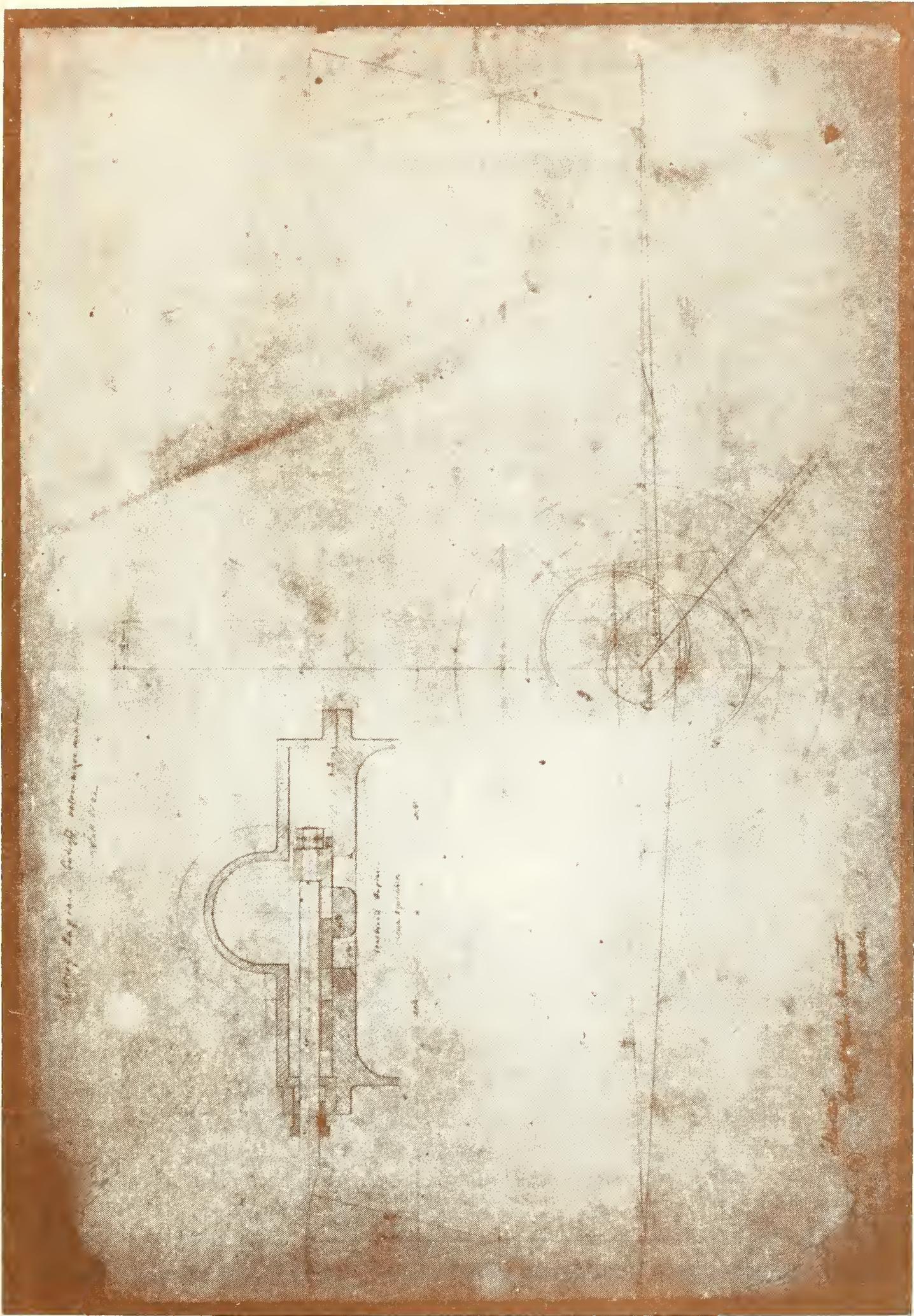
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 71(126)

Condition: Good

Remarks:

This drawing shows a section of the cut-off, or expansion, valve in the steam chest and a diagram of the relative motion of the propeller shaft and the valve eccentrics of the starboard side of the engine. The "movement" drawing positions the port and starboard main eccentric, the port and starboard cut-off eccentrics and the main crank when the starboard piston is "full in" the cylinder.



121. "BATTERY ENGINE CUT-OFF VALVE MOVEMENT" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 122

Title: "BATTERY ENGINE. VALVE CHESTS, VALVES, AND VALVE STEMS"

Date of Subject:
ca. October 1861 (est.)

Draftsman/Life Dates:
Charles William MacCord (1836-1915)

Medium: Ink on buff paper.

Size [Sheet]:
22 inches by 32 1/2 inches (est.)

Size [Sight]:
20 1/2 inches by 30 1/2 inches (est.)

Inscribed:
Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:
"Two sets Right and Left."
"a. Composition Metal." [Valve rod bushings]

Signature/Initials: " 'Monitor' / C. W. MacCord" [Ink]

Rendered: ca. October 1861 (est.)

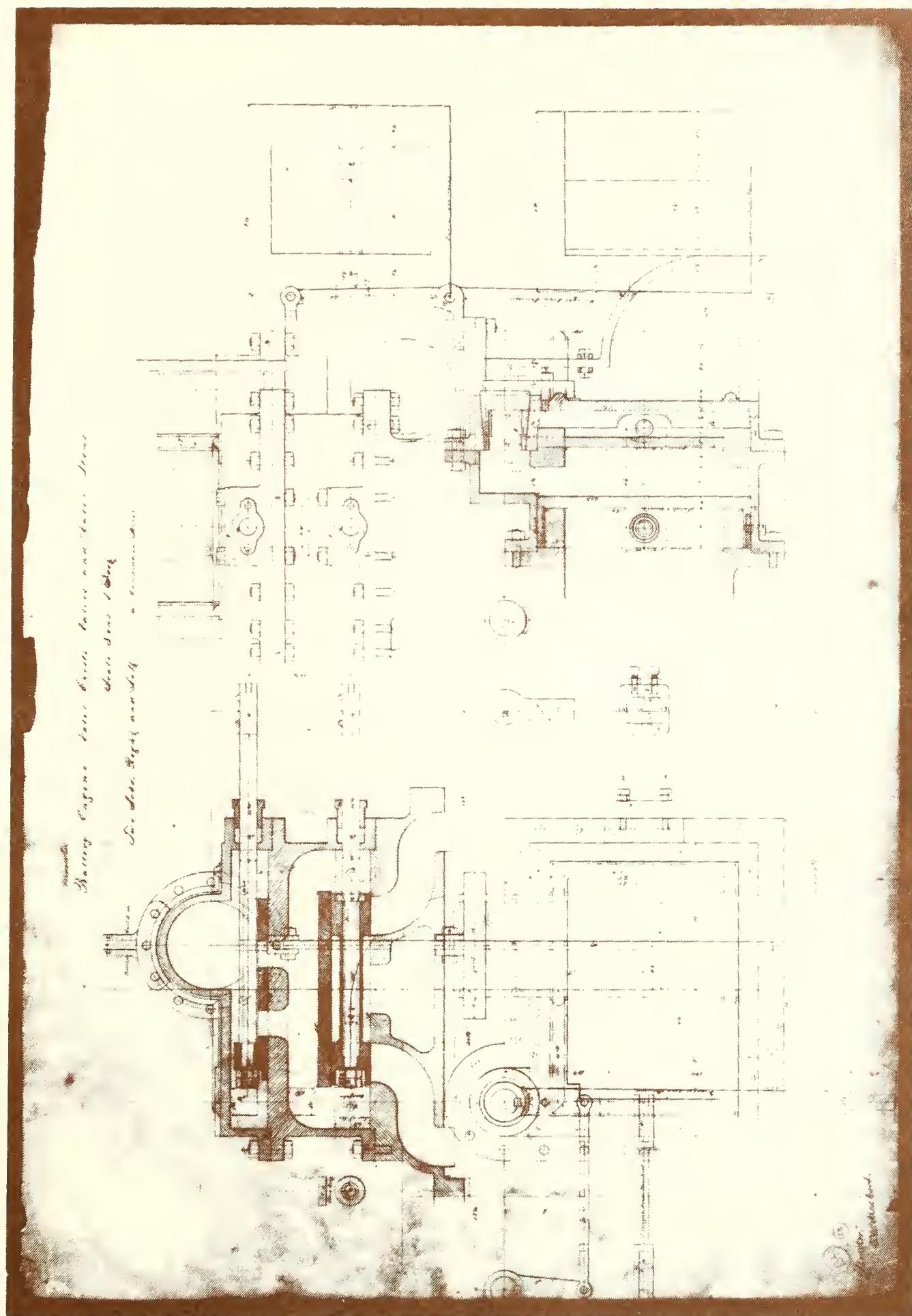
Original:
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 13(134)

Condition: Excellent

Remarks:
This drawing presents four detailed views of the valve chest of the port side of the engine and two control levers. One lever operates a crank in an athwartships movement at the center of the engine for starting operations. The other lever moves the rod running fore and aft in line with the steam pipe leading to the port steam chest. The function of this latter control is not certain, but may be an alternate scheme for operating the condenser injection cock. This lever is evident in the engine room photograph of the *Passaic*-class monitor, U.S.S. *Camanche*¹.

Footnote:
¹ Collection of Charles S. Schwartz.



122. "BATTERY ENGINE. VALVE CHESTS, VALVES, AND VALVE STEMS"
 (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 123

Title: " 'BATTERY.' BRACKETS AND PILLOW BLOCKS FOR VALVE LEVERS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and red ink on paper.

Size [Sheet]:

16 inches by 26 inches (est.)

Size [Sight]:

13 inches by 24 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

- "Two of This. Right and Left."
- "a. Composition Metal. Polished"
- "b. Babbetts [sic.] Metal"
- "Valve Gear. Wrought Iron. Polished"

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

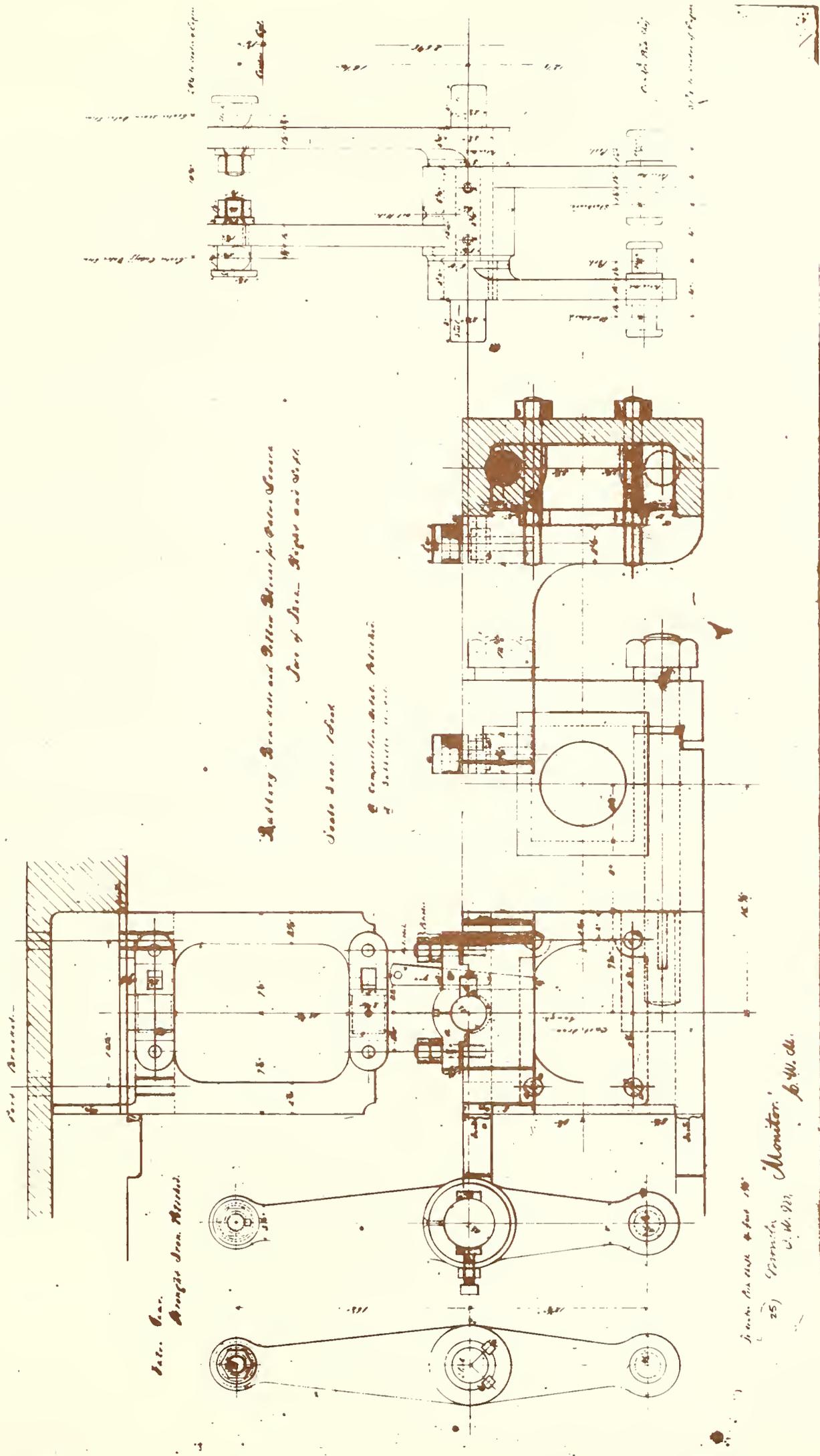
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 25(103)

Condition: Excellent

Remarks:

This drawing shows the details of the port bracket and levers for the port and starboard valve gear, noting the positions of the crank pins for the port and starboard. The clamp arrangement for the rock shaft pillow blocks are illustrated. The shafts for the valve levers are steel.



123. "BATTERY" BRACKETS AND PILLOW BLOCKS FOR VALVE LEVERS"
 (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 124

Title: " 'BATTERY' ENGINE. ECCENTRIC RODS AND STRAPS, ECCENTRICS, AND REVERSING GEAR."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, and red ink on buff paper.

Size [Sheet]:

18 3/4 inches by 36 1/2 inches (est.)

Size [Sight]:

15 1/4 inches by 33 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"Explanations/a. Composition Metal. Polished/b. Cast Iron. Polished/c. Wrought Iron. Polished/d. Babbetts (sic.) Metal/s. Steel, set screws."

Signature/Initials: "Monitor/C.W.M." [Pencil]
" 'Monitor'/C. W. MacCord" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

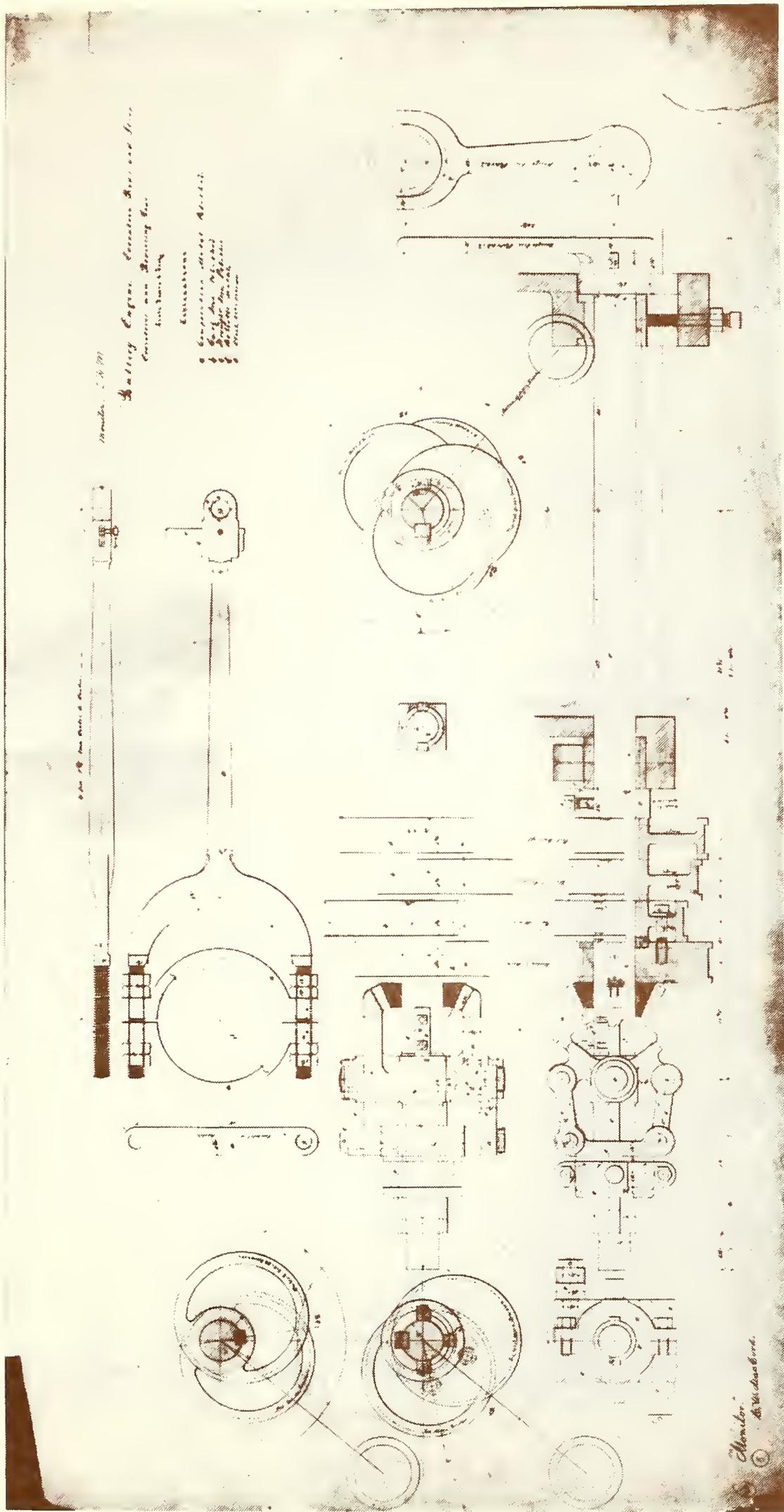
Identification: Drawing No. 5(142)

Condition: Excellent

Remarks:

This drawing shows nine views of the components of the reversing gear for the main engine. The eccentric shaft crank is attached to the main crank pin by a yoke arrangement that allows flexibility between the engine and the propeller shafting. The port and starboard main and cut-off valve eccentrics are connected to a bevel gear that can be rotated 90 degrees with respect to two counter-rotating bevel sector gears. These sector gears are rotated by a fore and aft motion of a sliding linkage operated by a yoke. The

yoke is supported by a strut pivoted on the deck in front of the forward engine bulkhead. The yoke is driven by a manually cranked lead screw passing through the strut. A stop on the shaft drives the eccentrics and limits the motion to 90 degrees of lead. The relative angular positions of the four eccentrics are shown for the main crank with "no lead" and 90 degrees of lead or "reverse" position. The views also include the rods that operate the valves.



124. "BATTERY" ENGINE. ECCENTRIC RODS AND STRAPS, ECCENTRICS, AND REVERSING GEAR." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 125

Title: "MAIN ENGINE REVERSING GEAR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

26 inches by 32 1/2 inches (est.)

Size [Sight]:

24 3/8 inches by 32 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (estimated)

Signature/Initials: "Monitor/Capt. E." [Pencil]

" 'Monitor'/Main Engine Reversing Gear/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

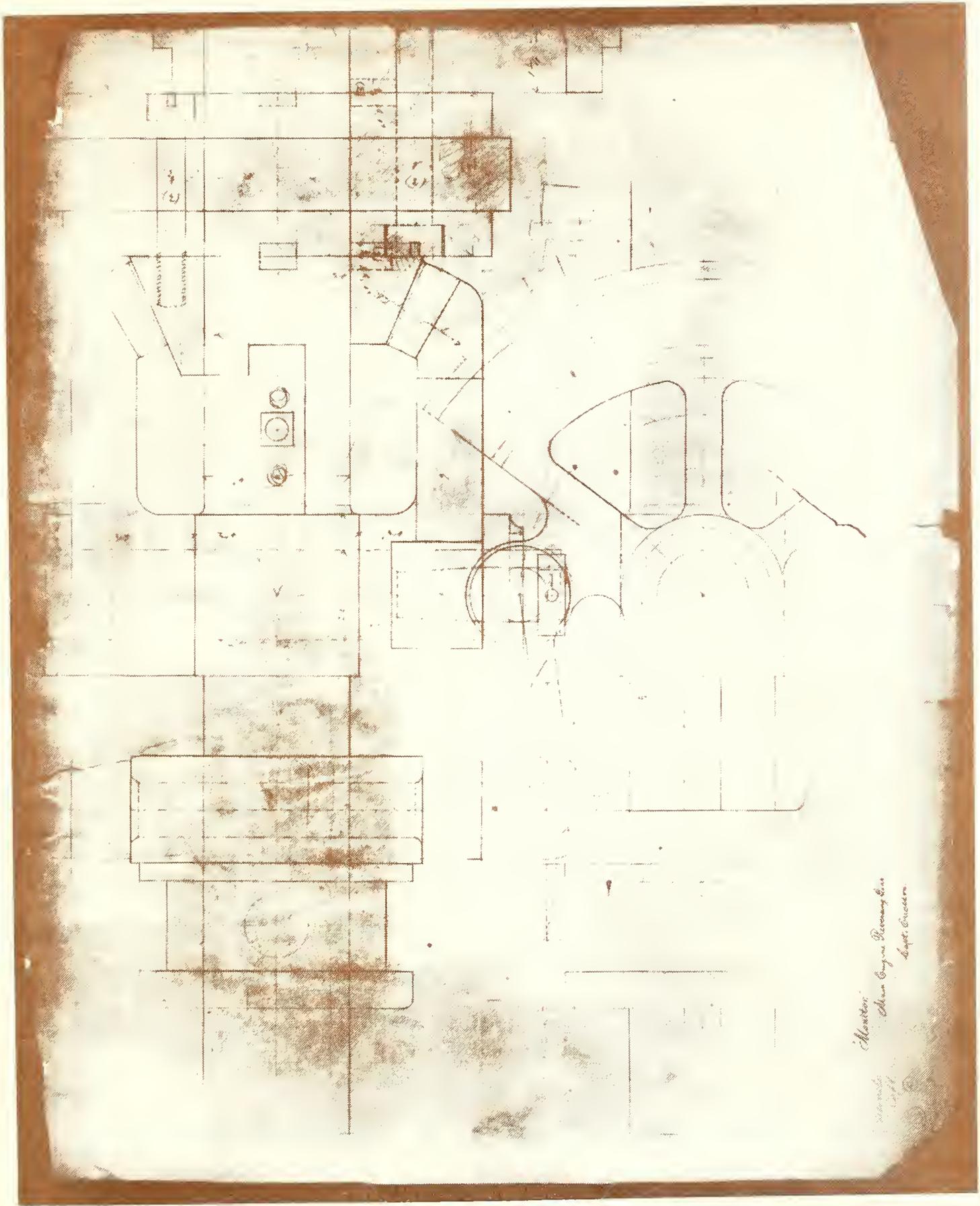
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 47(136)

Condition: Poor. Edges broken and torn halfway across.

Remarks:

This is a rough drawing of the sector gearing that rotates the eccentrics 90 degrees and causes the valve motion to reverse the engine. The sketch shows the extreme fore and aft position of the gear.



125. "MAIN ENGINE REVERSING GEAR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 126

Title: Main Engine Reversing Gear

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, and red ink and pencil on paper.

Size [Sheet]:

25 inches by 34 inches (est.)

Size [Sight]:

21 3/8 inches by 30 inches (est.)

Inscribed:

Scale: 6 inches = 1 foot (est.)

Notes: "Reversing gear. (turning eccentrics)" [Pencil]

Signature/Initials: "Monitor/C. W. M." [Pencil]

" 'Monitor'/Reversing Gear/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

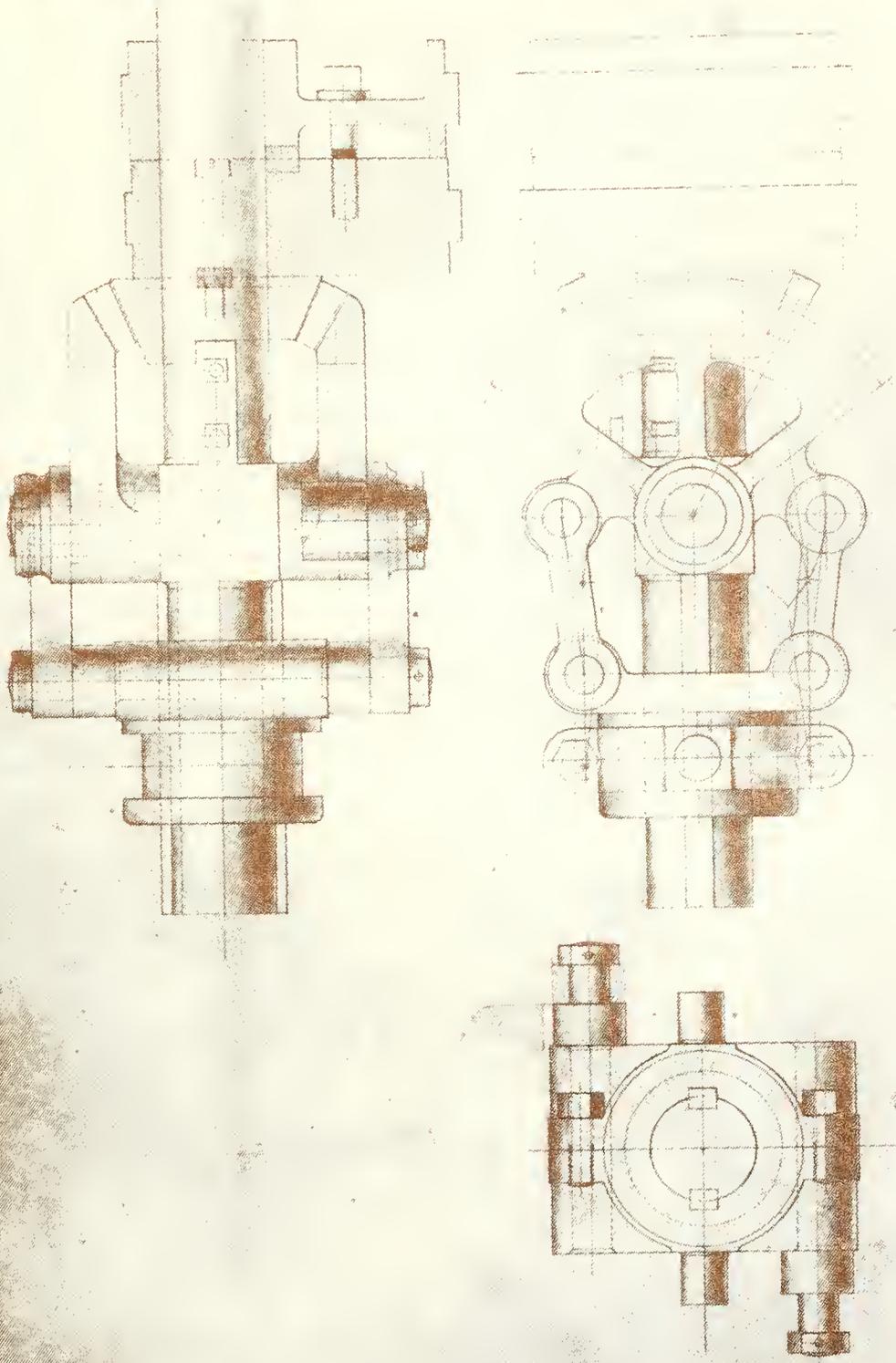
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 44(86)

Condition: Excellent

Remarks:

This is a finished drawing of the sector gearing, the starboard and port eccentrics, and the yoke trunnions. The extreme motions of the sector gear are indicated schematically in red.



*Monitor Reversing Gear.
L. W. Deane.*

126. Main Engine Reversing Gear (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 127

Title: "BATTERY REVERSING GEAR — WROUGHT IRON. POLISHED"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

22 3/4 inches by 31 1/4 inches (est.)

Size [Sight]:

21 1/2 inches by 31 inches

Inscribed:

Scale: Full size (est.)

Notes:

"Engine Bulkhead"

"To be placed on the Engine room Floor" [The deck pivot]

"2 feet to center of Screw Shaft"

"2 feet to center of Y" [Y is the center of the deck pivot]

Signature/Initials: "Monitor/Capt. E." [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology

S.C. Williams Library

MacCord Collection

Identification: Drawing No. 65(137)

Condition: Poor. Oil spotted. Edges broken.

Remarks:

This rough drawing of the handcrank arrangement for the reversing gear shows the handcrank, the screw shaft working through the forward engine bulkhead, and the yoke strut and deck pivot. Turning the crank clockwise, looking aft, forces the yoke away from the engine (the screw being left-handed) and rotates the eccentric counterclockwise 90 degrees, reversing the engine.



127. "BATTERY REVERSING GEAR — WROUGHT IRON. POLISHED"
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 128

Title: "BATTERY ENGINE. PROPELLER SHAFT. TURNED ALL OVER/STUFFING BOX OF PROPELLER SHAFT/THRUST BEARING"

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

20 1/4 inches by 36 1/2 inches (est.)

Size [Sight]:

20 1/4 inches by 35 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3" = one foot"

Signature/Initials: "Monitor/Made by Capt. Ericsson" [Pencil]
" 'Monitor' /Capt. Ericsson" (Ink]

Rendered: ca. October 1861 (est.)

Original:

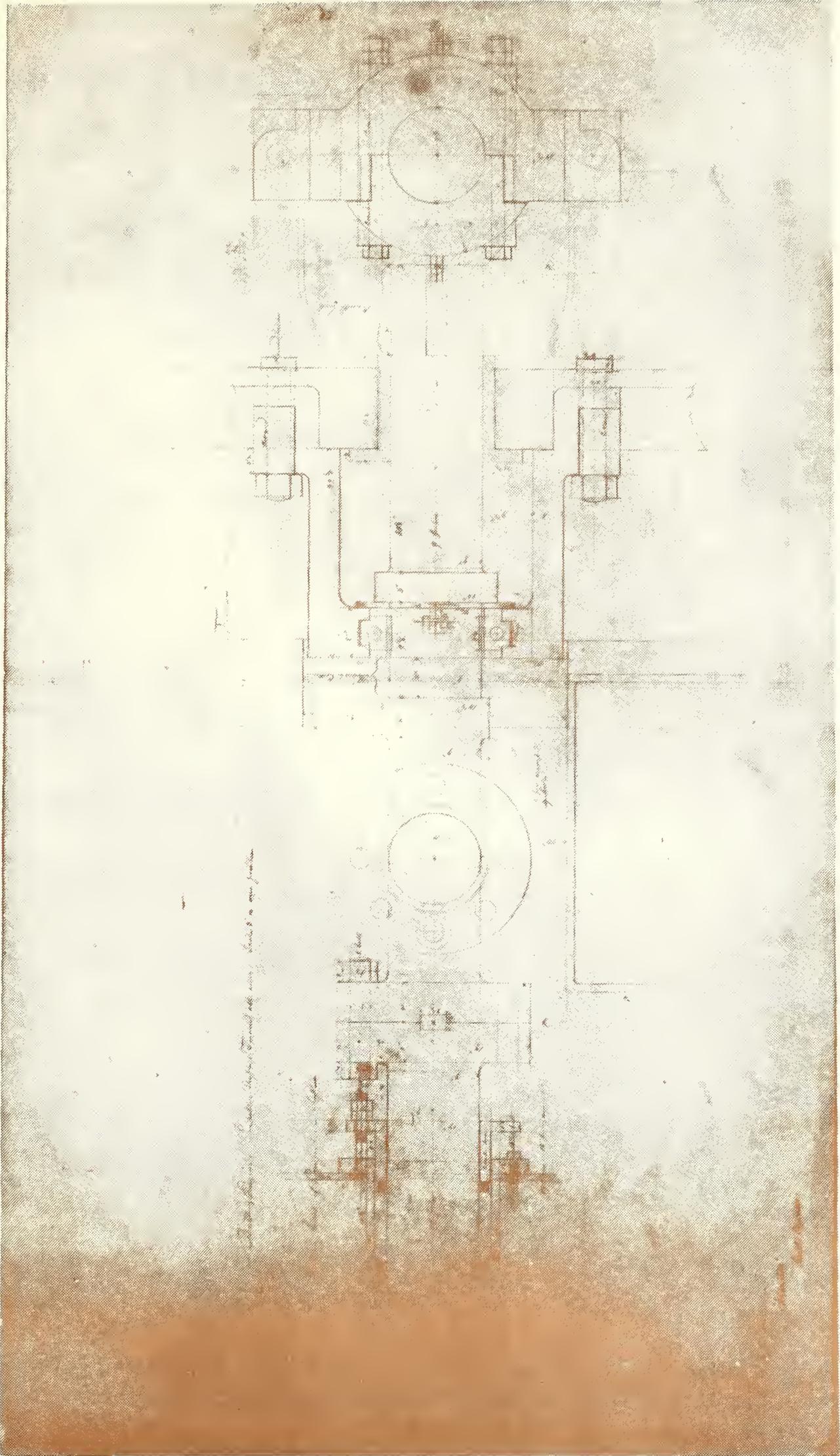
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 23(139)

Condition: Good

Remarks:

This drawing shows the propeller shaft thrust bearing, the coupling, and the stuffing box at the stern. The thrust collar is indicated but not detailed.



128. "BATTERY ENGINE. PROPELLER SHAFT. TURNED ALL OVER/STUFFING BOX OF PROPELLER SHAFT/THRUST BEARING" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 129

Title: " 'BATTERY.' MAIN CRANK AND PROPELLER SHAFT WITH STUFFING BOX'

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue and brown ink on paper.

Size [Sheet]:

12 3/4 inches by 25 1/2 inches (est.)

Size [Sight]:

9 1/2 inches by 22 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot" [Propeller shaft]
"3 ins. = 1 Foot" [Stuffing Box]

Notes:

"Wrought Iron" [Main Crank]

"Wrought Iron Shaft Turned all over" [Propeller Shaft]

"Steel" [Main Crank pin]

"Cast Iron" [Stuffing Box]

Signature/Initials: "Monitor/C.W.M." [Pencil]

" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

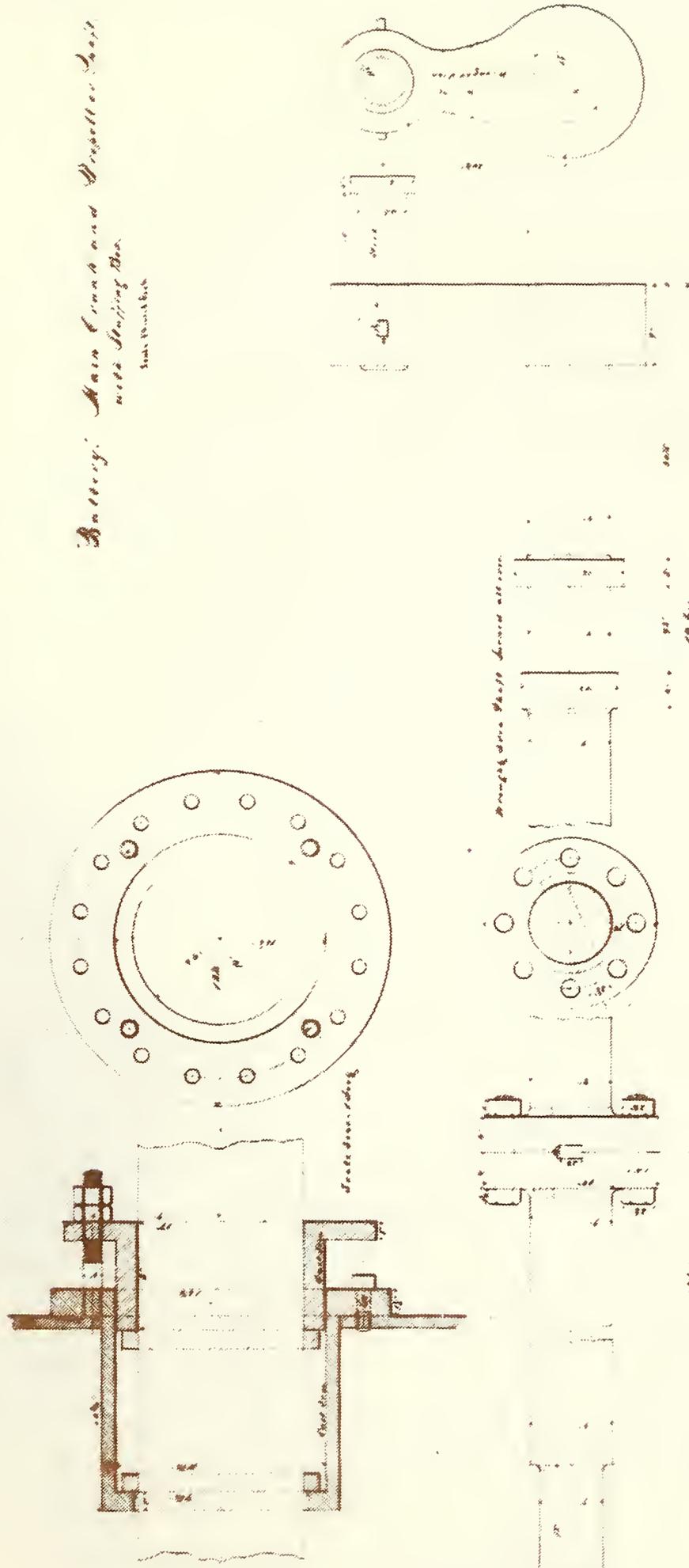
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 68(116)

Condition: Excellent

Remarks:

This drawing shows the 30-foot-1-inch (overall length), 9-inch-diameter, solid propeller shaft, the coupling, thrust collars, main crank and crank pin and the propeller shaft stuffing box mounted on a 5/8-inch thick hull box.



Alonzo B. S. S.
S. S. S.

129. "BATTERY" MAIN CRANK AND PROPELLER SHAFT WITH STUFFING BOX"
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 130

Title: " 'BATTERY.' PROPELLER"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Ink on paper.

Size [Sheet]:

13 1/2 inches by 22 inches (est.)

Size [Sight]:

10 3/4 inches by 18 7/8 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Notes:

"Diameter. 9 Feet: Pitch. 16 Feet"

"Monitor/Propeller (Conventional Working Drawing)/C.W.M." [Ink]

Signature/Initials: "Original Monitor/C.W.M." [Ink]

Rendered: ca. November 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 49(112)

Condition: Excellent

Publication:

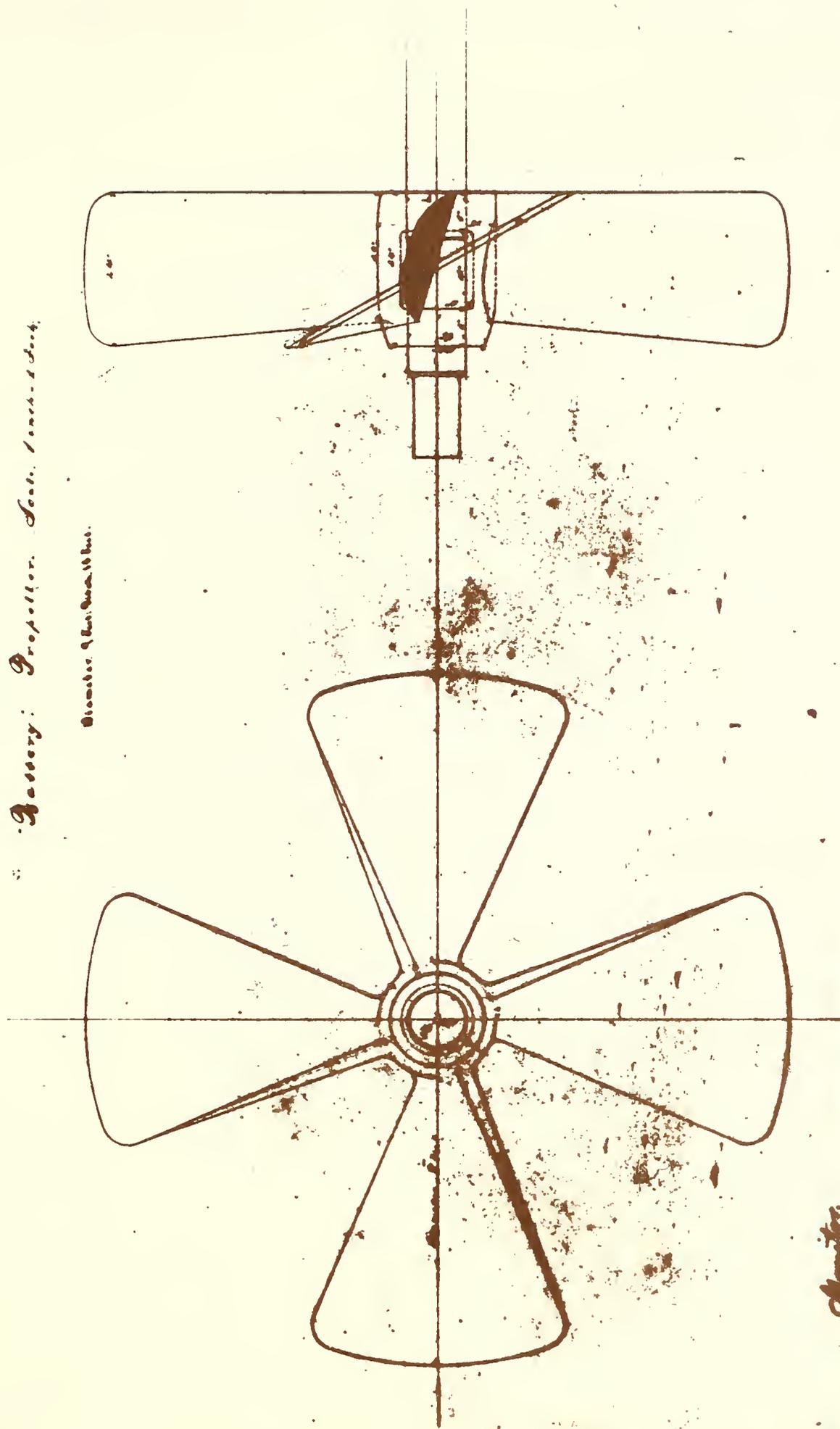
Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 29.

Remarks:

The drawing of the 9-foot-diameter, 16-foot pitch propeller shows a shoulder on the propeller shaft within the propeller hub, which is not indicated on Catalog Drawing 129.

Battery: Propeller. Sect. Length 1 foot.

Diameter of Hub 1 1/2 inch.



Chambers.

Propeller (Construction of Battery)

1864



130. "BATTERY" PROPELLER" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 131

Title: "PROPELLER WHEEL/ERICSSON BATTERY 'MONITOR,'/CONTINENTAL WORKS, GREEN POINT"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

10 3/8 inches by 14 7/8 inches

Size [Sight]:

10 inches by 14 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: 1 inch = 1 foot (est.)

Notes: "Diameter. 9 Feet, Pitch. 16 Feet"

Rendered: ca. October 1861 (est.)

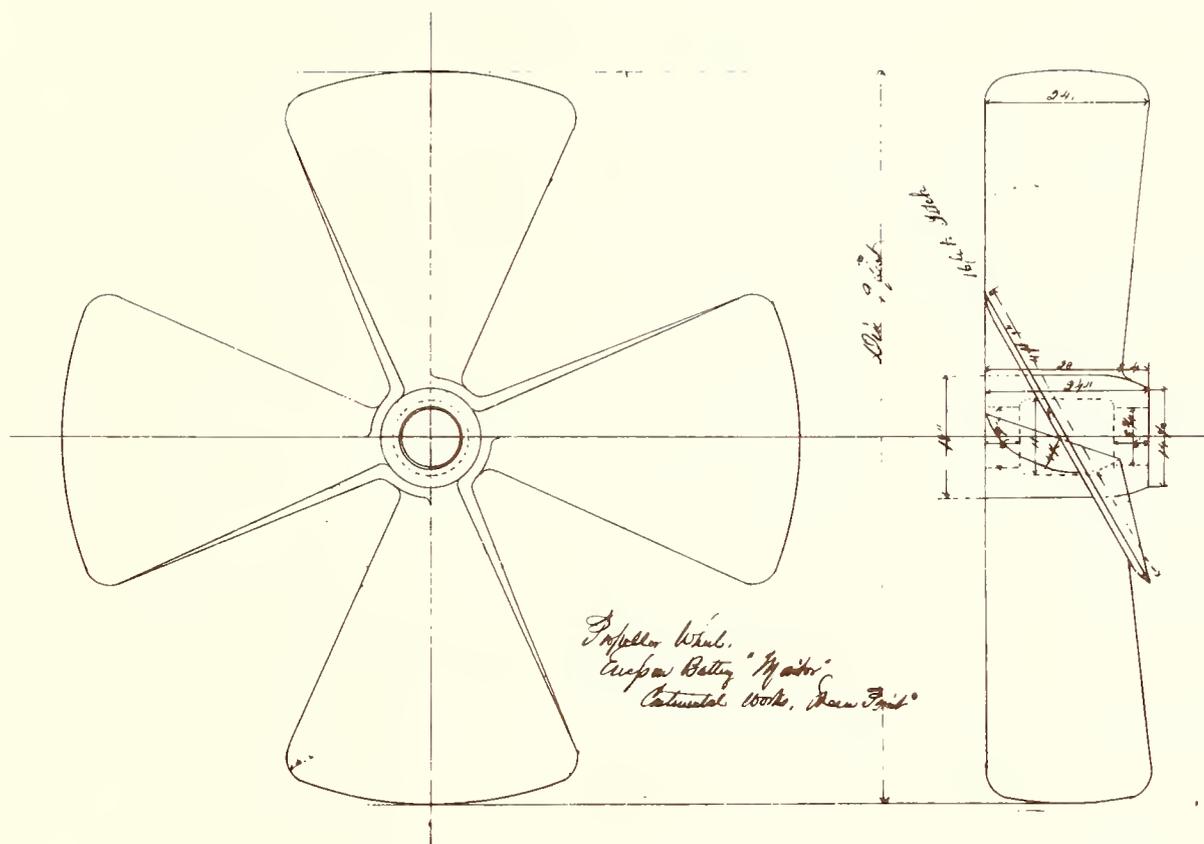
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing shows the propeller dismounted from the shaft.



131. "PROPELLER WHEEL/ERICSSON BATTERY 'MONITOR'/CONTINENTAL WORKS, GREEN POINT" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 132

Title: "PROPELLER WHEEL/ERICSSON BATTERY 'MONITOR'/CONTINENTAL WORKS, GREEN POINT"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and red ink on tracing cloth.

Size [Sheet]:

11 3/4 inches by 15 1/4 inches

Size [Sight]:

10 1/2 inches by 14 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: 1 inch = 1 foot (est.)

Notes: "Diameter. 9 Feet, Pitch. 16 Feet"

Rendered: ca. October 1861 (est.)

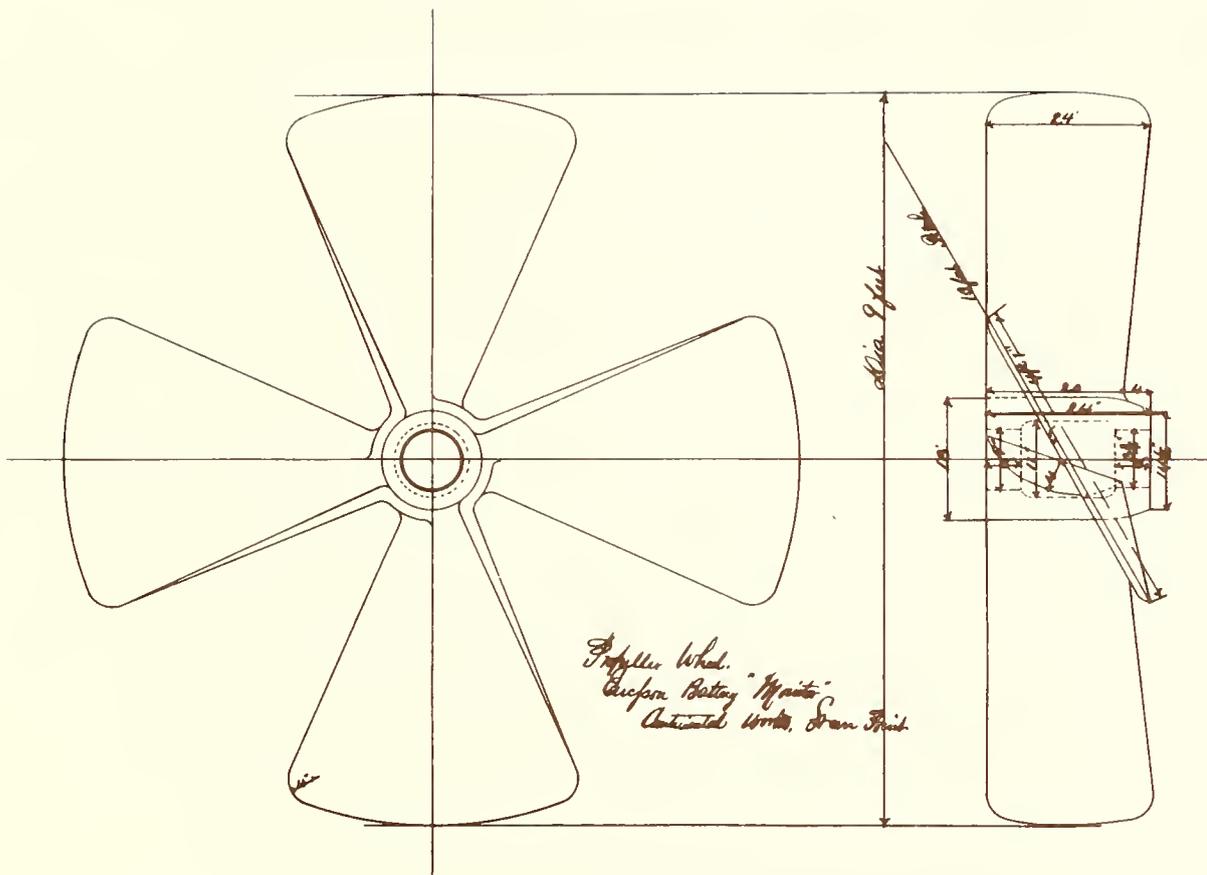
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is a Continental Iron Works tracing of Catalog Drawing 131.



132. "PROPELLER WHEEL/ERICSSON BATTERY 'MONITOR'/CONTINENTAL WORKS, GREEN POINT" (Thomas F. Rowland, Jr. Collection)

AUXILIARY MACHINERY

Numbers 133-141

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 133

Title: A Jet Injection Condenser Casing [Old Pattern?]

Date of Subject:

pre-October 1861 (est.)

Draftsman/Life Dates:

John Ericsson [?] (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

15 inches by 18 inches (est.)

Size [Sight]:

13 3/4 inches by 13 3/4 inches (est.)

Inscribed:

Scale: 1 1/2 inches = 1 foot (est.)

Signature/Initials: “ ‘Monitor’/Capt. Ericsson[?]”

Rendered: pre-October 1861 (est.)

Original:

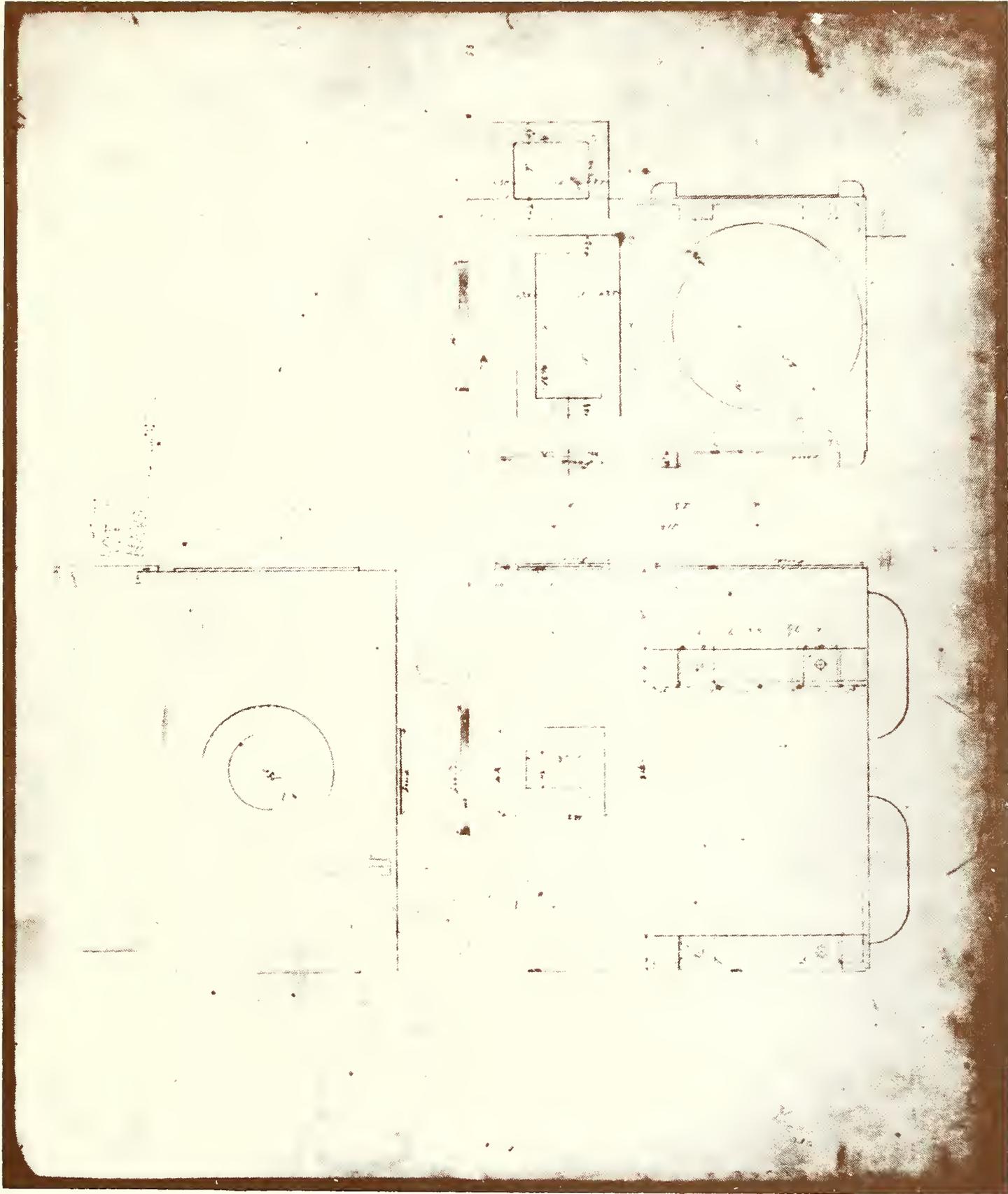
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 37(112)

Condition: Excellent

Remarks:

Several features of this untitled drawing differ from the drawings of the “Battery” condenser. For example, the shape of the exhaust steam pipe inlet is rectangular rather than circular; the pump brackets on the side are spaced differently than the Battery; and the high-pressure relief valve orifice on the top is larger than the Battery, being 9 1/2 inches v. 7 inches diameter. This drawing could represent the “Old Pattern” condenser mentioned in Catalog Drawing 134.



133. A Jet Injection Condenser Casing [Old Pattern?] (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 134

Title: "BATTERY ENGINE. CONDENSER."

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and red ink on paper.

Size [Sheet]:

22 3/4 inches by 32 1/4 inches (est.)

Size [Sight]:

20 3/4 inches by 29 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes: "One of this/Make hole and facing of Injection Valve to suit old pattern"

Signature/Initials: "Monitor/CWM" [Pencil]
" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 39(136)

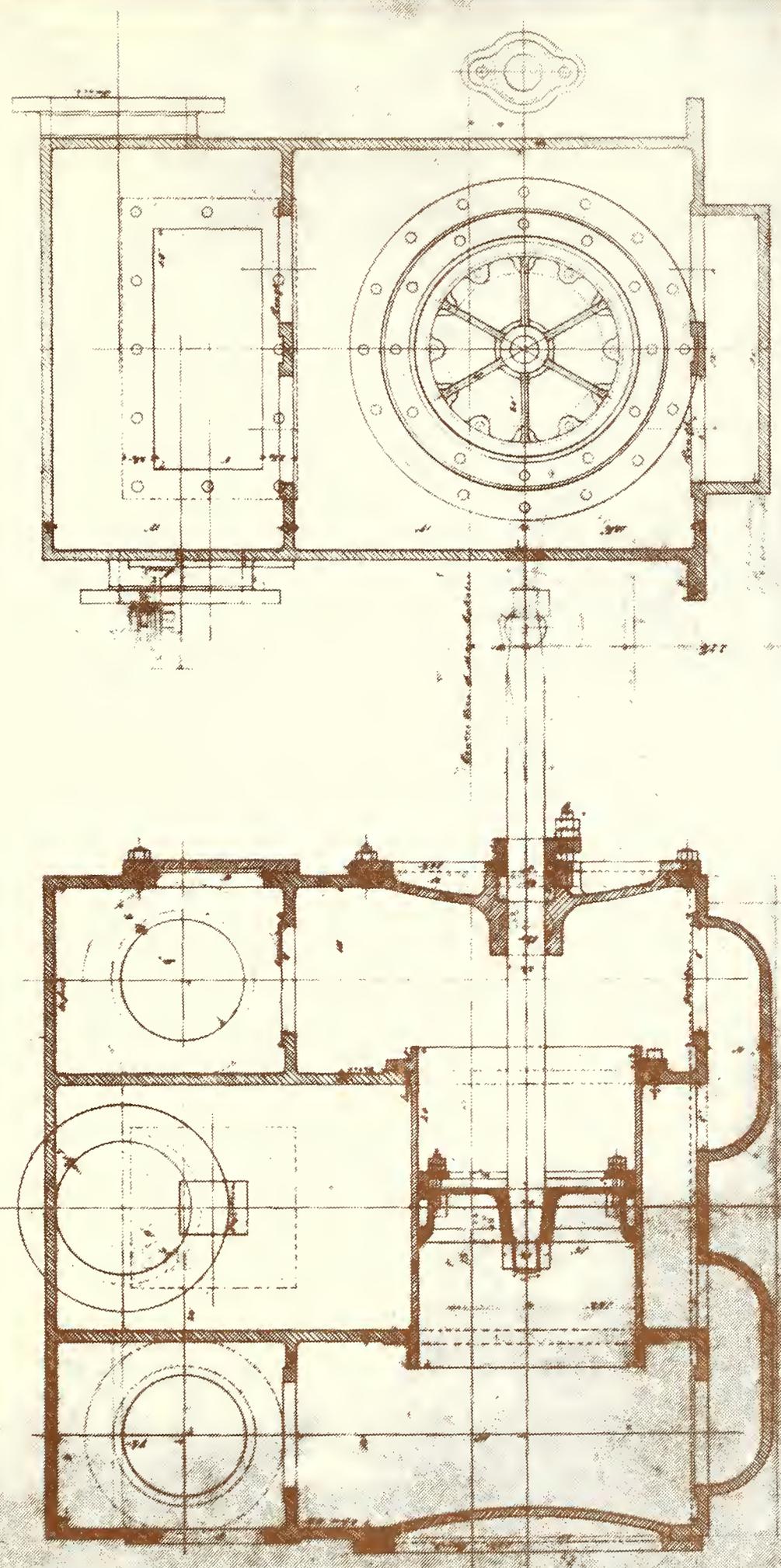
Condition: Excellent

Remarks:

This drawing emphasizes the construction of the condenser casing and shows a transverse section looking aft and an end view from the starboard side; the pump cylinder, piston, packing gland, piston rod, and piston rod bearing, and stuffing gland. There are pencil notes showing the location of the bilge force pump, which has no air vessel, and the injection valve. The engine exhaust steam flange, the piston head, and the connecting rod bearing gland are pictured in red. There are several notes in faint pencil giving distances to the underside of the deck beams, the rock shafts, and the propeller shaft.

Battery Engine. Condensing Box from Station 1. Shot
about 1840. not having of original form of part etc. etc.

From Iron B



134. "BATTERY ENGINE. CONDENSER." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 135

Title: " 'BATTERY' ENGINE. AIR PUMP AND CONDENSER"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, red, brown, and yellow ink on paper.

Size [Sheet]:

15 1/4 inches by 25 1/2 inches (est.)

Size [Sight]:

12 1/2 inches by 23 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2" = 1 Foot"

Signature/Initials: "Monitor/C. W. M." [Pencil]
" 'Monitor'/C. W. M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 24(103)

Condition: Excellent

Remarks:

This drawing shows the longitudinal section of the condenser as viewed from the port side and a transverse section looking aft. Fittings to the condenser include the injection cock, the feed pump with air vessel on the forward side of the condenser, the bilge pump on the after side, and portions of the condenser "strut" to the end of the port rock shaft. The outline of the high-pressure relief valve on the top of the condenser is shown protruding through the deck planking and protected by a circular, 16-inch-diameter, 1 3/4-inch-thick armored hatch in the deck. The hatch has a threaded hole for an eyebolt, but there are no indications that it is secured to the opening, resting in place by its own weight.

An auxiliary view (scale: 3 inches = 1 foot) shows the valve and guard. Pencil lines sketch in the injection cock control lever and rod running forward to the front of the engine.

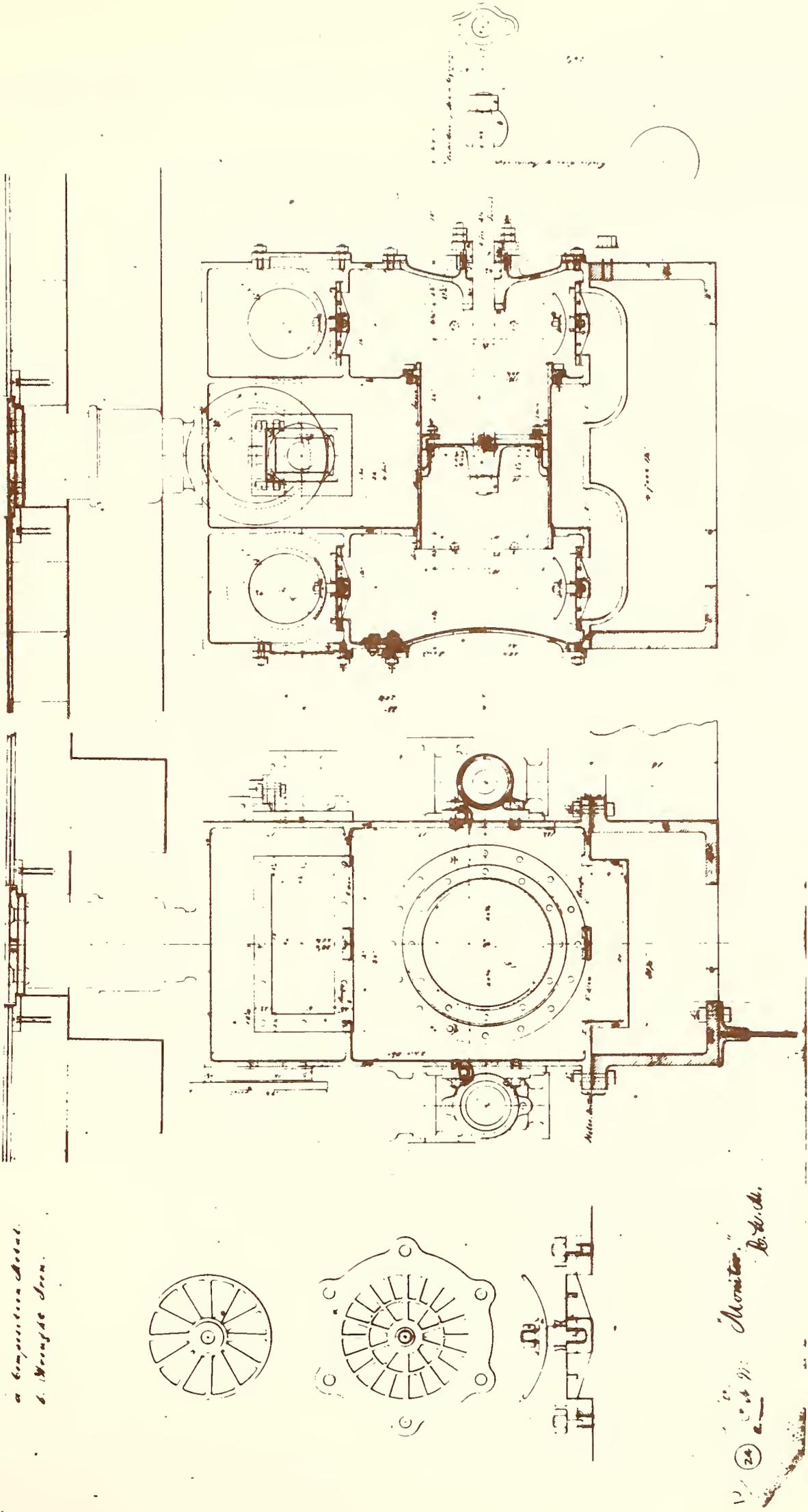
Although attributed by MacCord as one of his drawings of the “Battery,” this drawing, except for the lettering style and pencil annotations for the jet cock controls, is identical to a drawing for the air pump and condenser for the *Passaic*-class monitors¹, including the 12-inch deck beams. According to Isherwood, who ran tests on the efficiencies of the engines of the *Monitor* and the *Passaic*, the engines of both vessels “are in all respects — to the minutest detail — duplicate”; and this is assumed to include the condenser, which he describes as the “common jet kind.”² Inasmuch as the deck beams for the *Monitor* in the location of the condenser are 10 inches square and the diameter of the exhaust steam port from the main engine is 10 inches on this drawing, instead of 9 inches for the same port in Catalog Drawing 134, there appears to be some confusion whether this drawing is for the original *Monitor* or for the *Passaic*-class monitors. The word “Battery” may have been used interchangeably during the early development of these vessels. This same discrepancy can be found in Catalog Drawings 136 and 140.

Footnotes:

¹ Drawing “Office. Air Pump & Condenser, *Passaic* Class, No. 51.” Filed in the Draughting Room, Bureau of Steam Engineering, August 13, 1892.

² B. F. Isherwood, *Experimental Researches in Steam Engineering*, Philadelphia: Hall of the Franklin Institute, Volume 1, 2 volumes, 1863, p. 346.

Battery Engine. Air Pump and Condenser. Scale 1/2 in. = 1 Foot.



a. Compressor Detail.
b. Wright's Drum.

24
"Monitors"
B. W. A.

135. "BATTERY" ENGINE, AIR PUMP AND CONDENSER" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 136

Title: " 'BATTERY' ENGINE. FORCE PUMP, VALVE CHAMBER AND AIR VESSEL/
INJECTION COCK, AND HIGH PRESSURE ESCAPE VALVE"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, red and brown ink on paper.

Size [Sheet]:

18 3/8 inches by 25 1/2 inches (est.)

Size [Sight]:

17 inches by 24 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"Note. Force Pumps and Valve Chambers to be made Right and Left, one with
an Air Vessel and one without."

"Monitor" [Pencil]

Signature/Initials: " 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861¹ (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 12(103)

Condition: Excellent

Remarks:

This drawing displays the components of the condenser: the feed pump, the injection
cock, and the high-pressure escape valve.

The bottom drawing includes a transverse section of the feed pump, the cylinder,
piston, stuffing gland, and the check valve with the air vessel that equalizes the line
pressure. Two sections of the cylinder show the mounting brackets and the inboard and

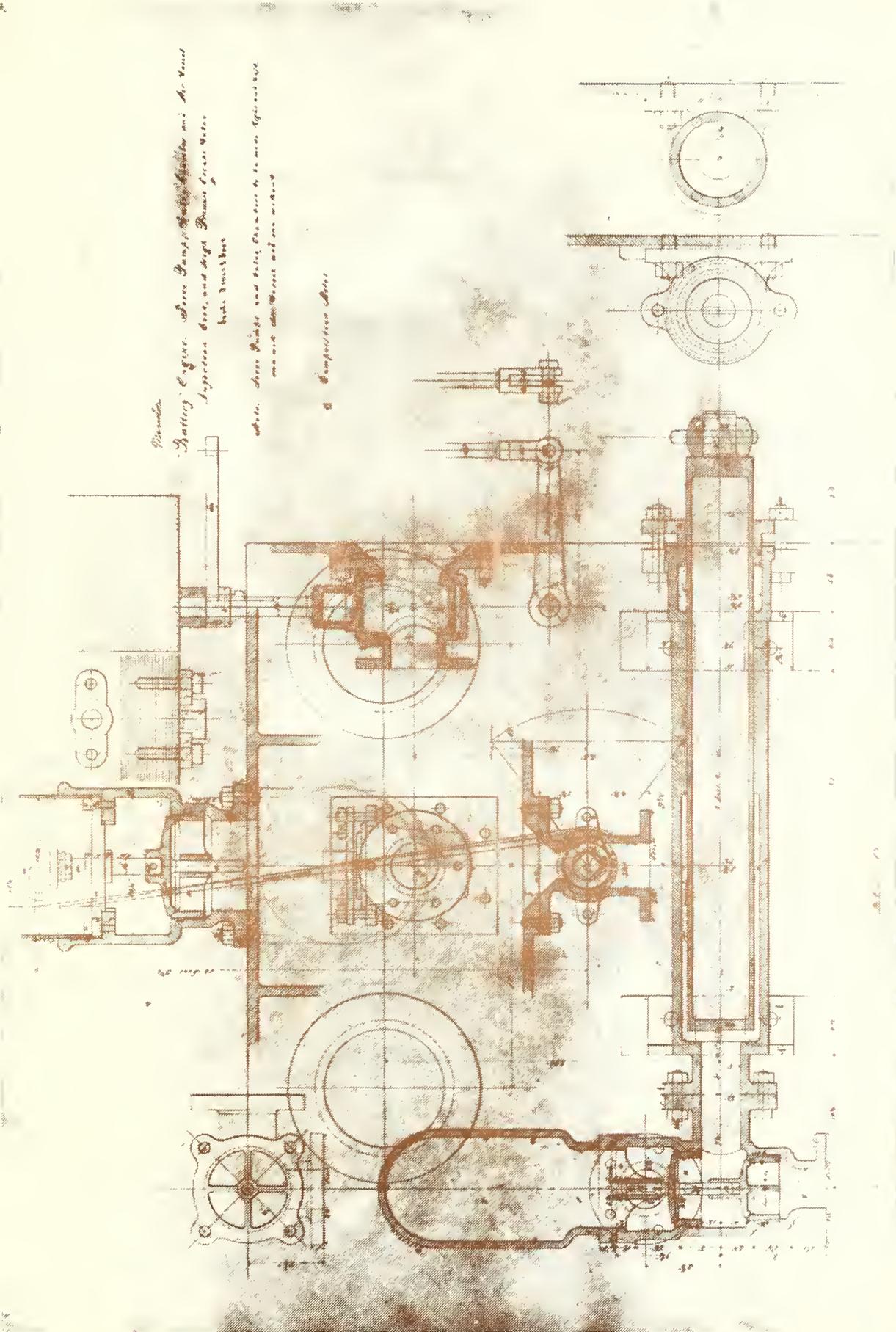
outboard ends; one section shows the flange connection to the cylinder, the delivery pipe flange on the forward side, and the webbing of the air vessel seat.

The middle drawing shows a longitudinal section of the injection cock from the starboard side, an end view looking aft, and a top view. The hollow, tapered, vertical and cylindrical plug of the cock has a round port on the suction side and a square port on the delivery side of the condenser chamber. The cock is turned by a square nut, which is operated through an overhead linkage from the starting platform forward of the main engine. The shaft driving the cock turns in a fitting on the deck beam overhead, to which is attached a lever running forward 13 feet 9 7/8 inches to the engine centerline. The rod is shown at a scale of 3/4 inch = 1 foot.

The high-pressure escape valve on the top of the condenser can be opened manually from the deck by removing the hatch and lifting a ring handle on the valve stem. This releases the pressure on the condenser, and the air and steam enters the valve upper chamber. A horizontal pipe in the port side of the chamber carries the discharge to the waste steam pipe running the length of the machinery compartment from the boiler safety valves to an opening in the deck at the after end of the machinery space.

Footnote:

¹ Cf. discussion in "Remarks" on Catalog Drawing 135.



136. " 'BATTERY' ENGINE. FORCE PUMP, VALVE CHAMBER AND AIR VESSEL/
 INJECTION COCK, AND HIGH PRESSURE ESCAPE VALVE"
 (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 137

Title: "BATTERY. INJECTION GEAR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

16 1/2 inches by 31 1/2 inches (est.)

Size [Sight]:

15 1/2 inches by 22 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes: "Wrought Iron - Polished"

Signature/Initials: "Monitor/Capt. E." [Pencil]
" 'Monitor'/Capt. Ericsson" [ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 52B(130)

Condition: Poor. Finger and handprints in grease. Many grease marks.

Remarks:

This drawing shows the hand crank, shaft, lever, and upper shaft hanger to be mounted on the centerline of the main engine on the front of the valve chests for operating the injection cock from the starting platform. The drawing is undimensioned, but the sketch in Catalog Drawing 110 shows the lower crank and the upper lever as being 18 inches and 10 inches long respectively. This may not be the final scheme used on the *Monitor*.



137. "BATTERY. INJECTION GEAR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 138

Title: " 'BATTERY' ENGINE. AIR PUMP ROD, BUCKET, CROSSHEAD, CONNECTING ROD AND LEVER WITH PLUNGERS OF FORCE PUMPS."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, and red ink on paper.

Size [Sheet]:

17 1/2 inches by 37 inches (est.)

Size [Sight]:

15 1/4 inches by 36 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes: "(Monitor)" [Pencil]

Signature/Initials: "'Monitor'/C. W. M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 64(142)

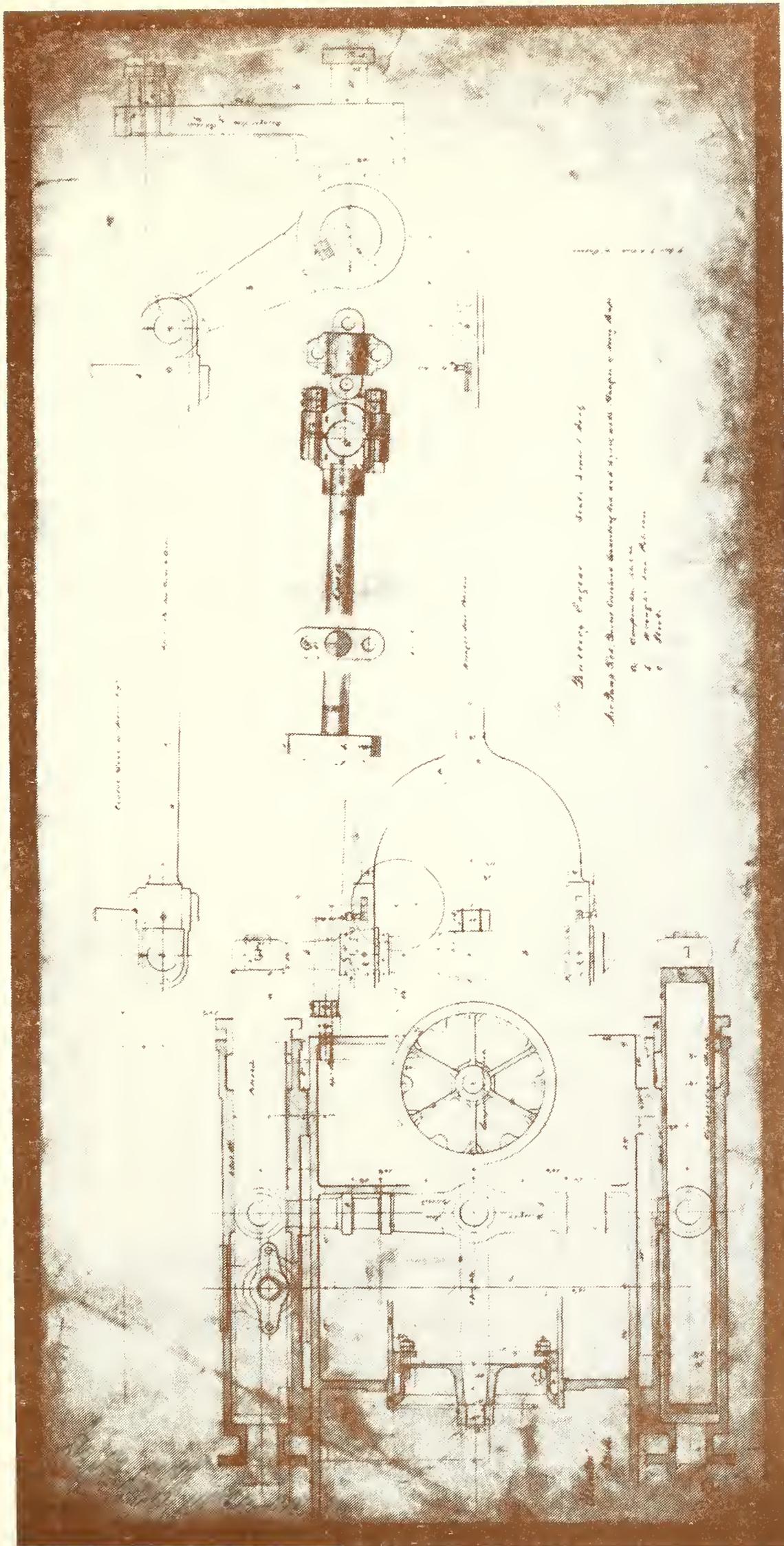
Condition: Excellent

Remarks:

This drawing shows (1) a plan section of the condenser through the centerline of the air, feed, and bilge pumps and includes the bucket and rod of the air pump and the plungers of the force pumps; (2) the ball-joint connections of the bucket rod and plungers to the crosshead on the inboard, or port, side of the condenser; (3) the attachment of the U-shaped branches of the connecting rod of the air pump to the crosshead with split bearings held in place with straps and keys; (4) the fastening of the port end of the connecting rod to the end of the port rock shaft; (5) a 2 1/2-inch-diameter, 6-foot-1 5/8-inch-long, wrought iron strut, which is connected to the after end of the port side of the condenser and terminated in a bearing on the extreme end of the port rock shaft to

prevent the working of the condenser on its mount against the resistance of the force and air pumps; and (6) the air pump rock shaft lever.

The condenser end of the air pump strut is also shown in Catalog Drawing 135.



138. " 'BATTERY' ENGINE. AIR PUMP ROD, BUCKET, CROSSHEAD, CONNECTING ROD AND LEVER WITH PLUNGERS OF FORCE PUMPS." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 139

Title: " 'BATTERY' ENGINE. AIR PUMP CONNECTING ROD."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on paper.

Size [Sheet]:

16 1/4 inches by 26 1/4 inches (est.)

Size [Sight]:

19 1/2 inches by 23 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (estimated for straps, keys, and blocks)
3 inches = 1 foot (estimated for rod)

Notes: " 'Monitor'/Air Pump Connecting Rod" [Ink in MacCord's hand]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 72(126)

Condition: Good

Remarks:

This drawing of the air pump connecting rod (5 feet, 1 7/8 inches between centers) is in two scales. The "full size" drawing is of the pump and rock shaft bearings, straps, and keys and shows the top and side dimensioned views of each end. The second drawing is superimposed on the first and shows the side and top view of the U-shaped connecting rod at a scale of 3 inches = 1 foot. Not shown are the oil cups for the bearings.



139. "BATTERY" ENGINE. AIR PUMP CONNECTING ROD." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 140

Title: "RETURN VALVE WITH FEED PIPE."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, red, brown and yellow ink on paper.

Size [Sheet]:

14 3/4 inches by 18 inches (est.)

Size [Sight]:

13 5/8 inches by 15 5/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 ins. = 1 Foot"

Signature/Initials: "Monitor/C. W. M." [Pencil]
" 'Monitor'/C. W. MacCord" [Ink]

Rendered: ca. October 1861¹ (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 9(96)

Condition: Excellent

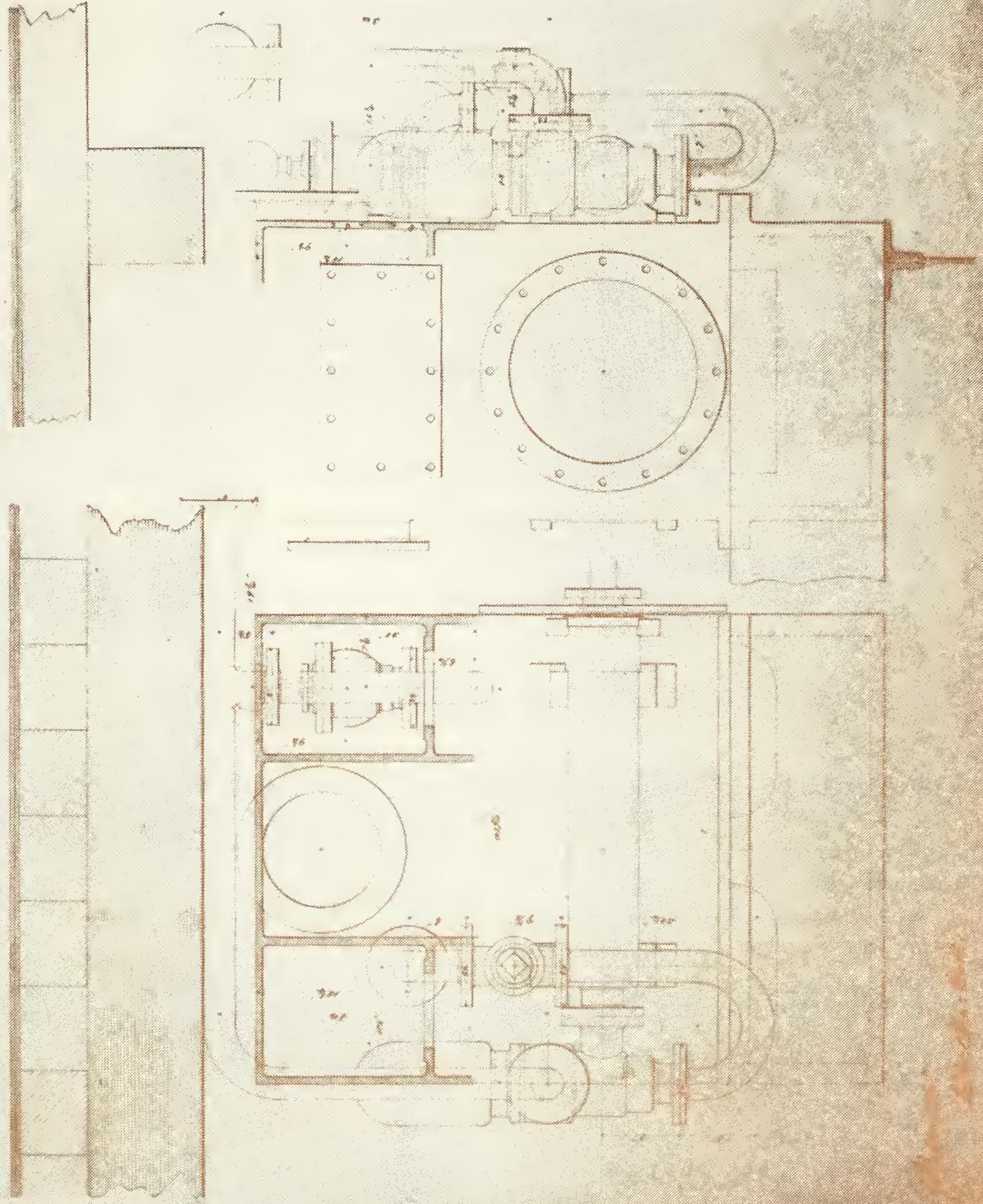
Remarks:

This drawing shows a front and end view of the condenser, feed pump, and associated piping arrangements looking aft and to port respectively. The feed pump draws water from the hot well through a regulating cock. The feed pump water, regulated by the air vessel, is forced into the boiler through the delivery pipe running athwartships over the condenser and then forward, outside the limits of the drawing.

Footnote:

¹ Cf. discussion in "Remarks" on Catalog Drawing 135.

Return Valve with Feed Pipe Scale 1/4" = 1' 0"



140. "RETURN VALVE WITH FEED PIPE." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 141

Title: "BATTERY. BLOWER ENGINES. RIGHT AND LEFT."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

19 1/2 inches by 31 1/2 inches (est.)

Size [Sight]:

19 1/8 inches by 30 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3" = 1 foot"

Notes:

"9 feet 2 inches" [Engine room deck to underside of deck beam]

"3 feet 6 inches" [Center of blower flywheel to top of deck beam]

"2 feet 4 1/4 inches" [Center of blower flywheel to engine flat]

Signature/Initials: "Monitor/Capt. E." [Pencil]

" 'Monitor'/Blower Engines/Capt. Ericsson." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 55(134)

Condition: Good

Remarks:

This drawing shows elevations of the starboard and forward sides of the port blower assembly and includes the engine, crank and bearing, main frame eccentric, 48-inch-diameter flywheel, coal bunker bulkhead, and the flywheel shaft bearing. The main frame is bolted to the forward side of the engine bulkhead and the corresponding deck beam. A 7-inch-by-14-inch vertical timber running from the engine flat to the underside of the deck beam is bolted to the back of the engine frame. In the front view of the engine, the centerline and outlines of the 39-inch-diameter blower and its 10-inch-diameter pulley are indicated behind the engine assembly.



141. "BATTERY. BLOWER ENGINES. RIGHT AND LEFT." (Stevens Institute of Technology)

SCANTLINGS
Numbers 142-148

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 142

Title: Draft of Ericsson's Instructions for Iron for the *Monitor*

Date of Subject:

October 1, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pen and ink on paper.

Size [Sheet]:

9 3/4 inches by 7 3/4 inches (est.)

Size [Sight]:

9 3/8 inches by 7 5/8 inches

Inscribed:

Notes:

"Winslow, Oct 1/61 (List of Plates for Battery)" [Notation on verso]
A sketch of rivets [on verso]

Rendered: October 1, 1861

Original:

Location: American-Swedish Historical Foundation Museum
John Ericsson Papers

Condition: Excellent

Publication:

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 4.

Remarks:

This document contains Ericsson's rough draft of the order to John F. Winslow for the hull and floor timber plating and framing scantlings for the *Monitor*. Winslow was the co-owner of the Albany Iron Works of Troy, New York, and one of the principals of the *Monitor* contract with the Navy.

The transcription of the order follows:

"These plates comprise the sides and ends of the vessel to be made scant 1/2 inch thick of the best scrap iron^{1, 2, 3} as their ends must stand bending, thus⁴:"

"All these plates should be made exactly of the dimensions marked, no allowance having been made for trimming."

“For the bottom of the boat will be requisitioned 477 running feet of 1/2 inch plate 3 feet 10 inches wide to be made in lengths of Seven feet long exactly. This uniform length enable[s] us to punch all holes before putting up the work by which [way] half time will be saved.”

“3 inch angle iron⁵ of substantial pattern and best materials for the bottom of the boat -viz[:.]”

“-50 bars 17 feet long”

“-6 " 14 1/2 feet long”

“-4 " 1/2 feet long”

“-2 " 12 feet long”

“3 1/2 inch angle iron- 22 bars- 21 feet long.”

“17 Floor plates 1/2 inch thick by 15 inches wide, 21 feet long”

“12 Floor plates 1/2 inch thick by 12 inches wide, 21 feet long”

Footnotes:

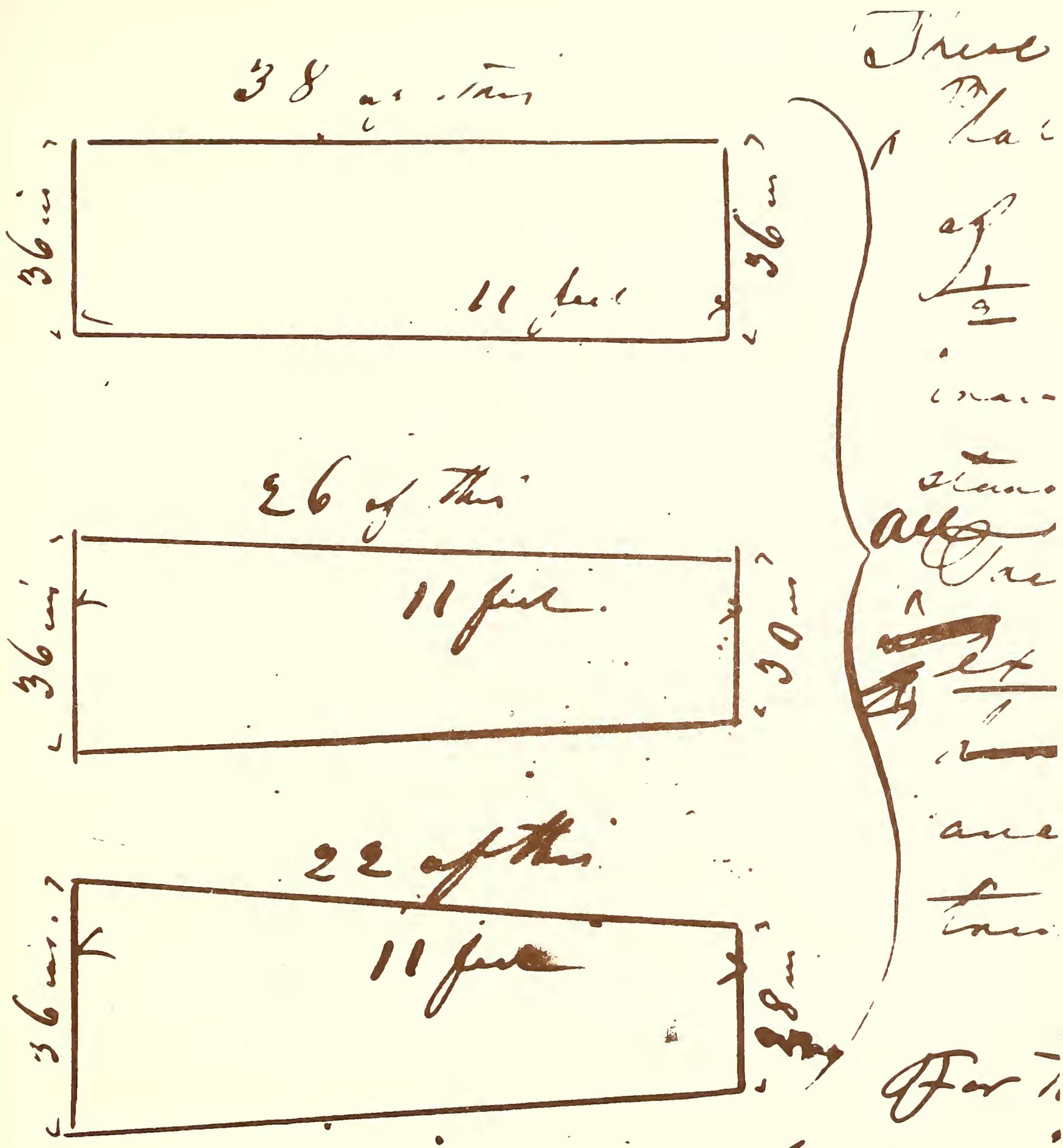
¹ Top figure represents central, sloping side plates: “38 of this [rectangular plate], 36 ins. x 11 feet”

² Center figure represents bow sloping sides: “26 of this [symmetrically tapered plate], 36” to 30” x 11 feet”

³ Bottom figure represents stern sloping sides: “22 of this [symmetrical tapered plates], 36” to 28” x 11 feet”

⁴ Sketch of plate end bent down at approximately 38° corresponding to the inclination of the *Monitor's* sides.

⁵ Sketch of the crossection of a 3-inch-by-3-inch angle iron.



142. Draft of Ericsson's Instructions for Iron for the Monitor (American-Swedish Historical Foundation)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 143

Title: Ericsson's Instructions to John F. Winslow for Iron for the *Monitor*

Date of Subject:

October 1, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pen and ink on ruled paper.

Size [Sheet]:

9 11/16 inches by 7 3/4 inches

Size [Sight]:

9 1/2 inches by 7 1/2 inches

Inscribed:

Title Block/Caption: See transcription

Signature/Initials: "J. E."

Rendered: October 1, 1861

Original:

Location: Smithsonian Institution
Archival Manuscripts
Chester Griswold Collection

Identification: Accession No. 90398, Catalog No. 35341(1), Item 3

Condition: Excellent

Remarks:

This document, containing the initial order for iron plate and bars for the *Monitor*, was made to John F. Winslow, co-owner of the Albany Iron Works of Troy, New York, by John Ericsson on October 1, 1861. The order reflects all the changes made in the draft letter of Catalog 142.

The transcriptions follows:

"Battery"

"These plates^{1,2,3} compose the sides and the ends of the vessel, to be made scant 1/2 inch thick of best scrap iron as their ends must stand bending, thus⁴:"

"All these plates should be exactly of the dimension marked, no allowance having been made for trimming."

“For the bottom of the vessel will be required 477 running feet of scant 1/2 inch thick plate, 3 feet 10 inches wide to be made in lengths of 7 1/2 feet exactly.⁵ This uniform length (Seven 1/2 feet) enables us to punch all holes before putting up the work, by which, half time will be saved. The ribs are 18 inches apart.”

“3 inch angle iron wanted:

50 bars	17	feet	long
6 bars	14 1/2	"	"
4 "	10 1/2	"	"
2 "	12	"	" "

“3 1/2 angle iron: 22 bars 21 feet long”

“Floor plates- 17 in number 1/2 inch by 15 inches by 21 feet long.”

“Floor plates- 12 in number 1/2 inch by 12 inches by 21 feet long.”

“The angle iron to be made of best materials and of substantial pattern.”

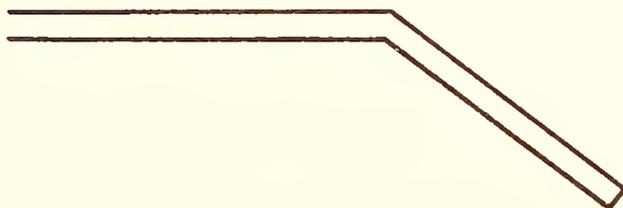
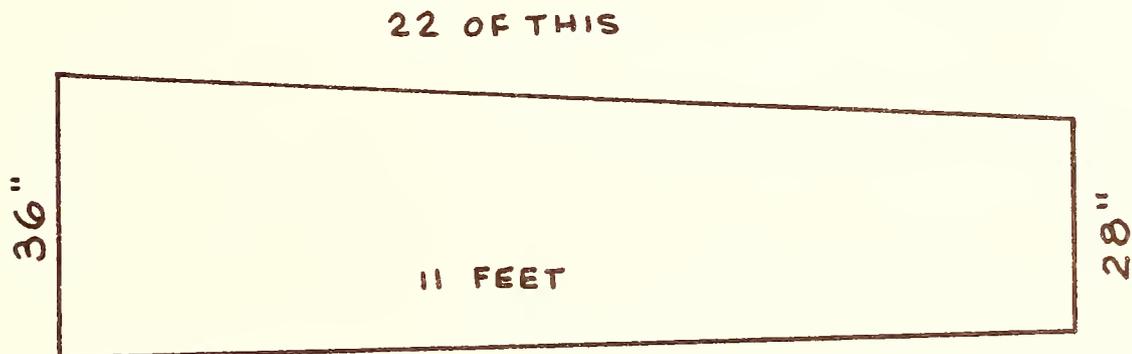
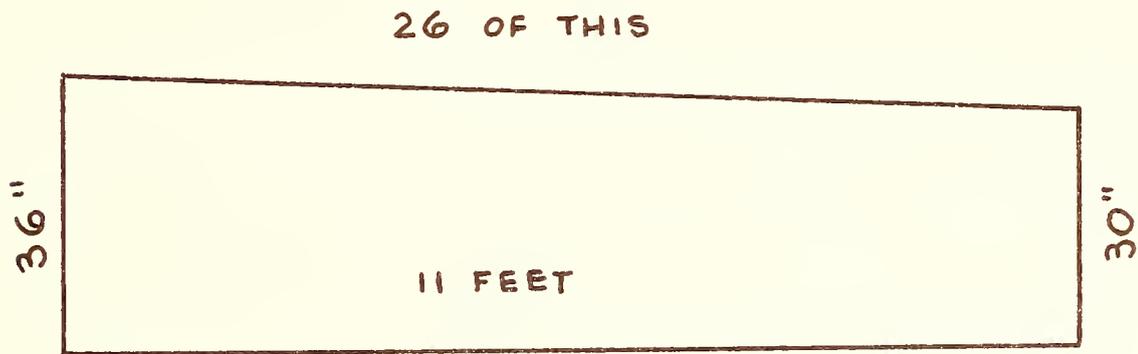
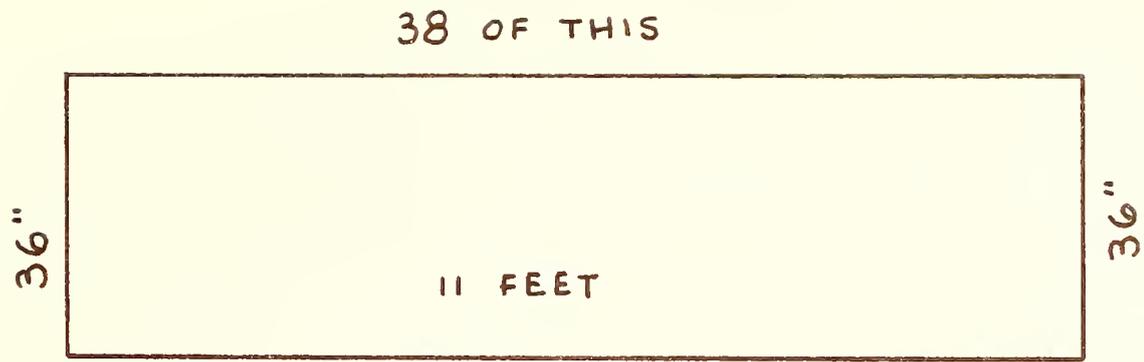
“Oct 1/61”

“J. E.”

“Observe. ‘Scant’ 1/2 means full 7/16””

Footnotes:

- ¹ Top figure represents central, sloping side plates: “38 of this [rectangular plate] 36 ins. by 11 feet”
- ² Center figure represents bow sloping sides: “26 of this [symmetrically tapered plate], 36” to 30” x 11 feet”
- ³ Bottom figure represents stern sloping sides: “22 of this [symmetrically tapered plates], 36” to 28” x 11 feet”
- ⁴ Sketch of plate end bent down at approximately 38 degrees corresponding to the inclination of the *Monitor*’s sides.
- ⁵ T.F. Rowland to John Winslow, October 12, 1861 changing length of bottom plates from 90 inches to 90 1/2 inches. Cf. Griswold Collection, Smithsonian, Cata. #35341(1), Item #18.



143. Ericsson's Instructions to John F. Winslow for Iron for the *Monitor* [transcribed by the author from the original] (Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 144

Title: "IRON ORDER FOR ERICSSONS STEAM/FLOATING BATTERY — LETTERS DATED OCTO 1ST, 6TH & 8TH/1861"

Date of Subject:

ca. October 1-8, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and ink on ruled paper.

Size [Sheet]:

12 3/4 inches by 7 3/4 inches

Size [Sight]:

12 1/4 inches by 7 3/4 inches (obverse)
9 1/2 inches by 7 1/2 inches (reverse)

Inscribed:

Title Block/Caption: See title.

Notes: See transcription

Rendered: ca. October 17, 1861

Original:

Location: Smithsonian Institution
Archival Manuscripts
Chester Griswold Collection

Identification: Accession No. 90398, Catalog No. 35341(1), Items 4 and 8.

Condition: Excellent

Remarks:

These two pages are a chronological listing of an order received by John A. Griswold from John Ericsson beginning October 1-8 and delivered October 14-17, 1861. Annotations indicate subletting the floor timber to Holdane and Company of New York. The order of October 1 repeats the request of Catalog Drawing 143 and adds an order on October 6, 1861 for butt straps. On October 8 the turret armor and side armor are included.

The transcription follows:

"Iron Order for Ericssons Steam Floating Battery — Letters dated Octo 1st, 6th, & 8th 1861"

“Octor 1- 38 Plates 36 In x 11 ft. x Scant 1/2 In
 “ “ 26 “ “ 36 In x 30 x 11 ft. x Scant 1/2 In¹
 “ “ 22 Plates 28 x 36 x 11 ft. x Scant 1/2 In²
 “ “ 447 running feet of Plates³
 Each plate exactly 7 1/2⁴ ft. long x 46 In x Scant 1/2

Octor 1- 17 floor plates 21 feet x 15 In x 1/2 In Scant⁵
 “ 12 “ “ 21 “ x 12 “ x do⁶
 “ 50 Bars Angle Iron 17 ft. x 3 In x 3 In -Best⁷
 “ 6 “ “ “ 14 1/2 “ x “ “ x “ “ - “ 8
 “ 4 “ “ “ 10 1/2 “ x “ “ x “ “ - “ 9
 “ 2 “ “ “ 12 “ x “ “ x “ “ - “ 10
 “ 22 “ “ “ 21 “ x 3 1/4 “ x 3 1/2 “ - “ 11
 “Observe Scant 1/2 In means full 7/16”

Oct 6 150 feet plates in Strips 5 In wide x Scant 1/2 in as long lengths as practicable wanted for making butt joints.

see J Ericssons letter of 1st & 6th October for above

OVER”

“Order Continued fr. Other Side

Octor. 9th

“ 192 Plates for “Turret”
 9 ft. long in 8 different widths, ranging from 31 3/8 Inches to 33 3/4 Inches wide & 24 plates of Each width - x 1 Inch thick -there will be something over 100 tons of them -

“ 408 Plates for “Armor” round the vessel
 5 feet x 5 feet x 1 In thick - the weight of these will be something about 190 tons

All the plates are to be very accurately rolled to thickness & sheared with great precision to sizes given -with square & not bevelled Edges, as it is not proposed to trim or plane the edges before applying them.”

“J. Errickson [sic]
 Octr. 1st 1861
 No. 1 Steam Battery”¹²

Footnotes:

¹ Accompanied by a symmetrically tapered figure, 36 inches to 30 inches wide x 11 feet long.

² Accompanied by a symmetrically tapered figure, 36 inches to 28 inches wide x 11 feet long.

³ Delivery date annotated in the right margin for a total of 263 feet:

“30	feet sent Oct. 14
57	“ “ “ 15
82 1/2	“ “ “ 16
98	“ “ “ 17”

⁴ Change noted: “Oct 17th = 7 ft. 6 1/2.”

⁵ “Ordered of Holdane & Co.”

⁶ Ibid.

⁷ “Sent Oct. 14.” “Made”.

⁸ Ibid.

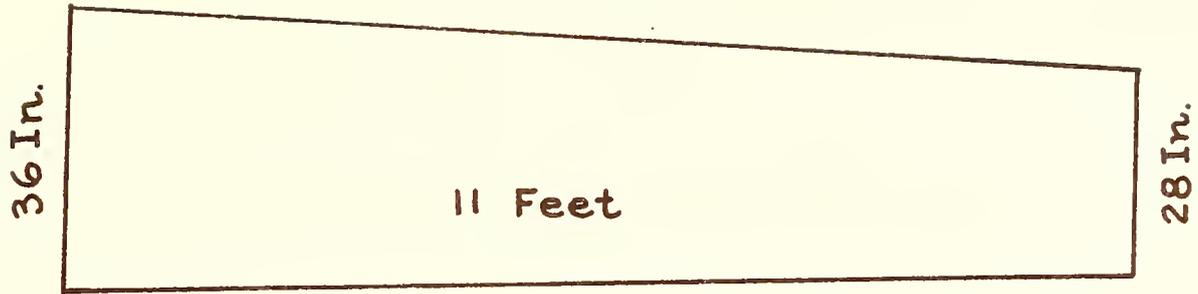
⁹ Ibid.

¹⁰ Ibid.

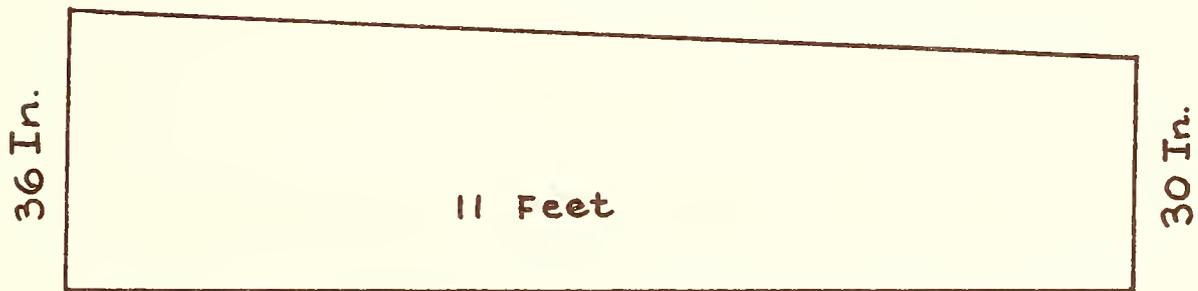
¹¹ “1/2 Made.”

¹² Filing notation on back of letter.

22 Plates



26 Plates



144. "IRON ORDER FOR ERICSSONS STEAM/FLOATING BATTERY — LETTERS DATED OCTO 1ST, 6TH & 8TH/1861" [Transcribed by author from original] (Smithsonian Institution)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 145

Title: "CORRECTED LIST OF PLATE, ANGLE, & BAR IRON WHICH HAS BEEN ORDERED FOR ERICSSONS [Sic] BATTERY BY T.F. ROWLAND PREVIOUS TO DATE, OCT 21ST 1861"

Date of Subject:

ca. October 26, 1861

Draftsman/Life Dates:

Thomas Fitch Rowland (1831-1907)

Medium: Pen and ink on ruled paper.

Size [Sheet]:

12 3/4 inches by 7 3/4 inches

Size [Sight]:

12 3/4 inches by 7 3/4 inches

Inscribed:

Title Block/Caption: See title.

Signature/Initials: "T. F. Rowland"

Rendered: ca. October 21, 1861 and October 26, 1861

Original:

Location: Smithsonian Institution
Archival Manuscripts
Chester Griswold Collection

Identification: Accession No. 90398, Catalog No. 35341(1), Item 31.

Condition: Excellent

Remarks:

This detailed description of plate and bar for the *Monitor* appears to have been furnished by T.F. Rowland, owner of the Continental Iron Works and prime contractor for the *Monitor*, to John F. Winslow. This list incorporates changes made to the initial order for iron made by Rowland on October 11, 1861¹.

The plate listings are grouped by strakes and correspond to those indicated on The builder's model² of the *Monitor*.

Strake/Nos.	Thickness	Location
"A" 1-34	3/8"	Vertical bulwarks of the hull behind the side armor.
"B" 1-15	3/8"	Outboard strake of the overhang.
"Diamond"		Inboard strake of the bow overhang.
"C" 1-2	3/8"	Second strake of the stern overhang.
"D" 1-2	3/8"	Third strake of the stern overhang.
"E" 1-2	3/8"	Fourth strake of the stern overhang.
"F" 1-2	3/8"	Fifth strake of the stern overhang.
"G" 1-3	3/8"	Sixth strake of the stern overhang.
"H" 1-3	5/16"	Outboard strake of propeller race.
"I" 1-3	5/16"	Center strake of propeller race.
"B.H." 1-19	3/8"	Main Bulkhead.
"S" 1-12	7/16"	Armor shelf.
"SS" 1-	7/16"	Possibly armor shelf.
"E.K." 1-4	1/2", 3/8"	Engine Keelsons.

Omitted from this corrected list, but appearing on the list of October 10, 1861, were the following orders and instructions:

- a. "108 Plates 3/8 thick (18" wide Taper to 7") — 48" long for Outside Knees, Marked OK"³
- b. "108 Plates 3/8 thick (27" wide Taper to 12") 53" long for Beam Knees, Marked PK"⁴
- c. The plates of Strake G are "to be flanged."
- d. The purposes of the marked angle iron were:
 - " 'A' Outside Knees"
 - " 'B' Inside Knees"
 - " 'C' Inside knees"
 - " 'D' Tying boats [hull and overhang] together"
- e. All tapered plates are to have their ends at right angles to one long edge.

Footnotes:

¹ T.F. Rowland to John A. Winslow, October 11, 1861. "List of iron. Ericsson Battery October 10, 1861." Cf. Griswold Collection, Smithsonian, Cata. No. 35341(1), Item #14.

² Gift of Thomas Fitch Rowland, Continental Iron Works, in 1862 to the New-York Historical Society, Accession No. 1862.9.

³ The outside knees support the armor shelf.

⁴ The inside knees support the deck beams.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 146

Title: "SECTIONS OF ANGLE IRON REQUIRED FOR ERICSSON'S BATTERY"

Date of Subject:

ca. October 14, 1861

Draftsman/Life Dates:

Thomas Fitch Rowland (1831-1907)

Medium: Pen and ink on ruled paper.

Size [Sheet]:

9 3/4 inches by 7 3/4 inches

Size [Sight]:

8 inches by 6 3/4 inches

Inscribed:

Title Block/Caption: See title.

Scale: Approximately full

Notes:

"Section of Iron furnished to/Capt. Ericsson, by/H. Abbott & Son/Chas. W. Whitney, Agt."

"Copy sent/Holdane & Co./J. F. W./October 14/61."

Signature/Initials: "J. F. W."

Rendered: October 14, 1861

Original:

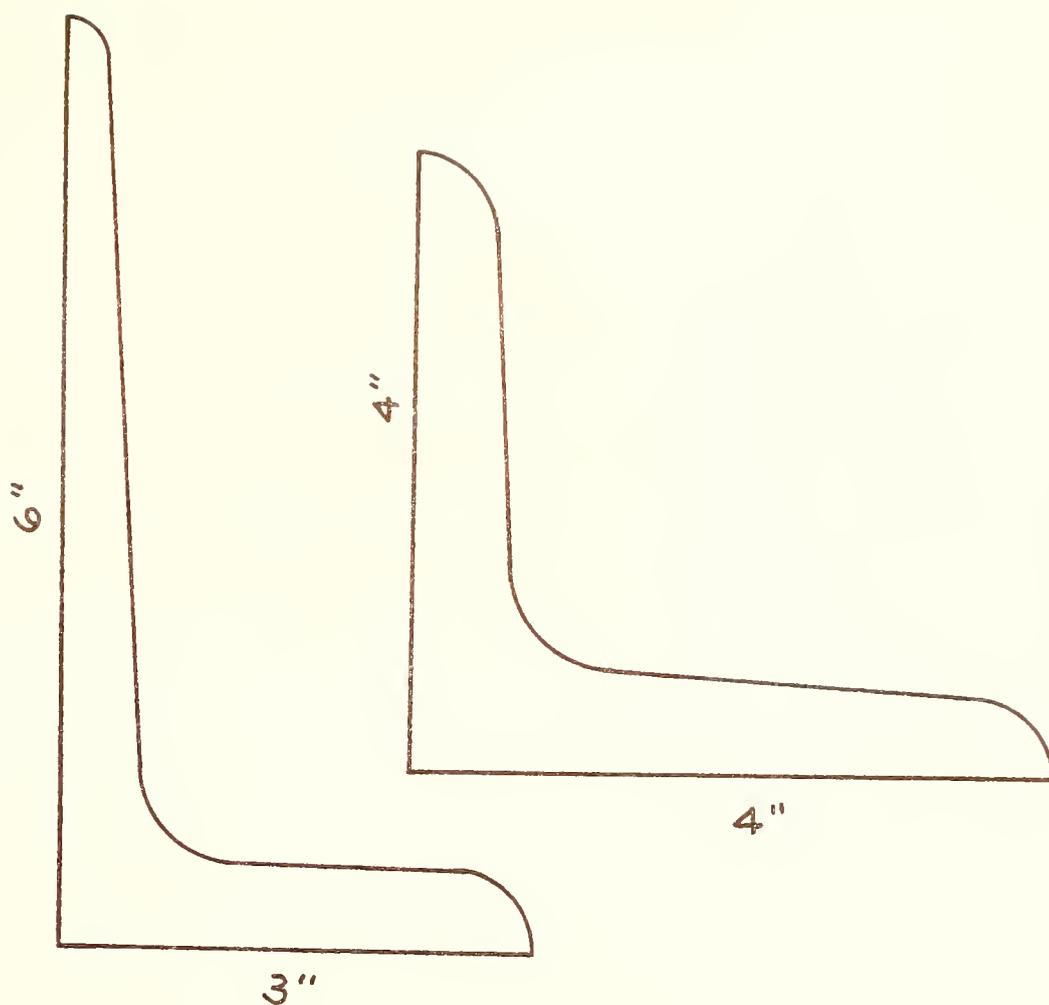
Location: Smithsonian Institution
Archival Manuscripts
Chester Griswold Collection

Identification: Accession No. 90398, Catalog No. 35341(1), Item 13.

Condition: Excellent

Remarks:

This sketch shows the 4-inch-by-4-inch and 3-inch-by-6-inch angle iron provided by H. Abbott & Son of Baltimore. The 3-inch-by-6-inch iron was the size of the main frames on the sloping sides. The 4-inch-by-4-inch angle does not appear in any of the previous tables and was used to flange the top of the floor timbers and the side bulwarks and provide the deck beam rests. The initials "J. F. W." are most likely those of John F. Winslow. Charles W. Whitney was an agent associated with Thomas F. Rowland.



146. "SECTIONS OF ANGLE IRON REQUIRED FOR ERICSSON'S BATTERY"
[Transcribed by author from original] (Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 147

Title: "HULL PLATE (DOWN SIDE), U.S.S. MONITOR"

Date of Subject:

August 2, 1977

Draftsman/Life Dates:

Ernest Wilson Peterkin (1920-)

Medium: Black and white photograph.

Size [Sheet]:

8 inches by 10 inches

Size [Sight]:

8 inches by 10 inches

Inscribed:

Title Block/Caption: See title.

Scale: Inch and meter scales included in photograph.

Notes:

"Recovered from Monitor Marine Sanctuary/2 August 1977"

"Weight (wet) = 60 lbs."

"Naval Research Laboratory"

Rendered: October 19, 1977

Original:

Location: Naval Research Laboratory
Washington, D.C. 20735

Identification: Photographic Negative 78527(2)

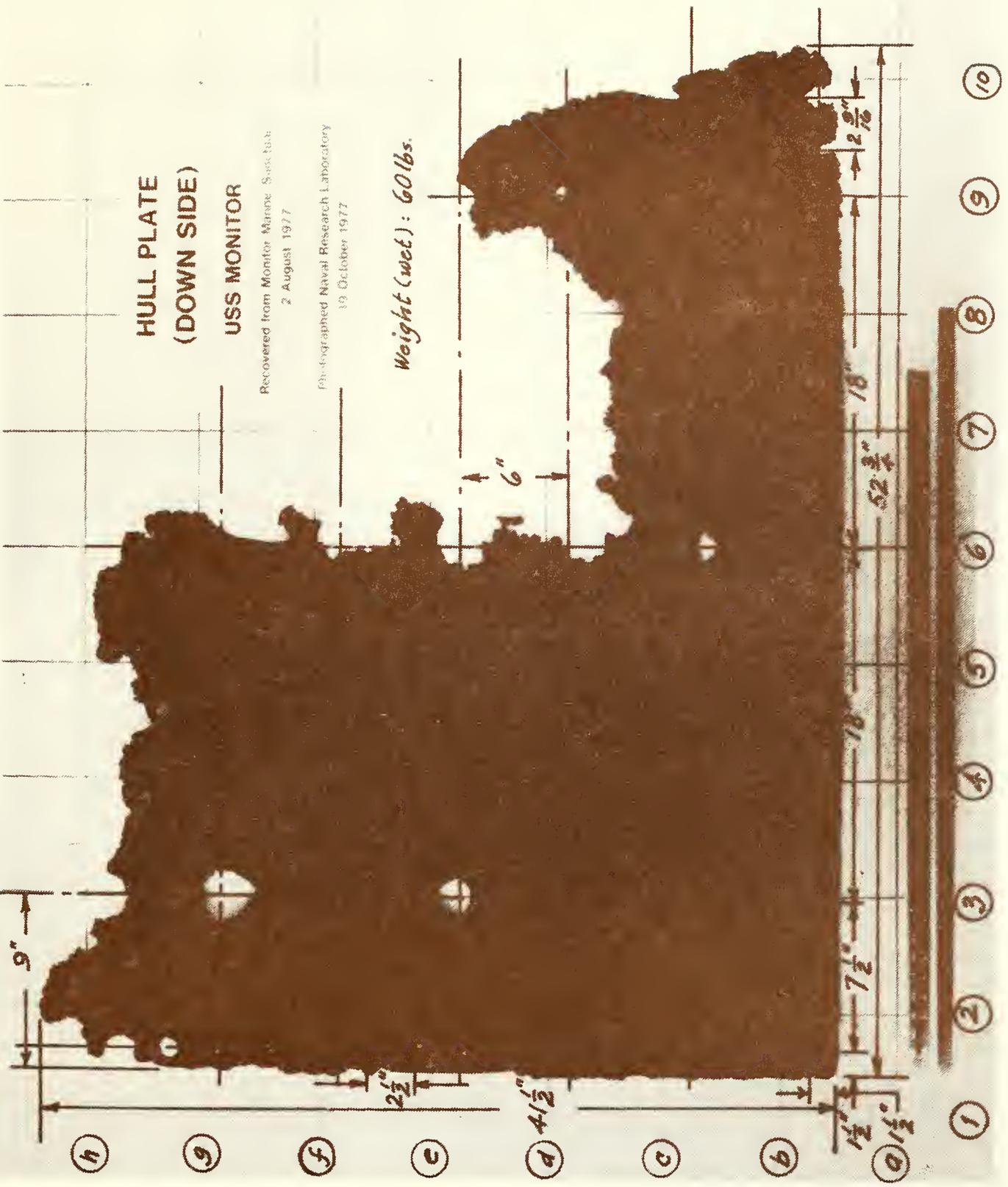
Condition: Excellent

Publication:

Ernest W. Peterkin, "Construction, Contents and Condition of the U.S.S. *Monitor*." *The Monitor, Its Meaning and Future*, Proceedings of National Conference, Raleigh, North Carolina, April, 1978, Washington: Preservation Press of the National Trust for Historic Preservation, 1978.

Remarks:

The hull plate shown in this photograph was snagged and dislodged by the Edgerton camera in August, 1973, during the Duke University Expedition. It was recovered during the NOAA/Harbor Branch Expedition in 1977. The dimensioned photograph shows the remains of a bottom plate to be approximately 41 1/2 inches by 52 3/4 inches. The internal rivet holes are spaced at 18 inches to agree with the *Monitor's* stiffeners and frames, and at this particular station on the hull the butts are shifted 9 inches off the frame rivet line. The back of the plates shows marks left in the fouling from the butt straps.



147. "HULL PLATE (DOWN SIDE), U. S. S. MONITOR" (Naval Research Laboratory)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 148

Title: Specifications for Side Armor of the *Monitor*

Date of Subject:

October 26, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pen and ink on stationary.

Size [Sheet]:

9 3/4 inches by 7 3/4 inches (est.)

Size [Sight]:

9 1/2 inches by 7 1/2 inches (est.)

Inscribed:

Notes: (See Remarks)

Rendered: October 26, 1861

Original:

Location: Smithsonian Institution
Archival Manuscripts
Chester Griswold Collection

Identification: Accession No. 90398, Catalog No. 35341(1), Item 36

Condition: Excellent

Remarks:

This order of October 26, 1861, from John Ericsson to Corning, Winslow specified the sizes and number of plates required for the final configuration of side armor for the *Monitor* in accordance with the changes shown in Catalog Drawing 65.

The order reads:

“New York, Oct. 26, 1861”

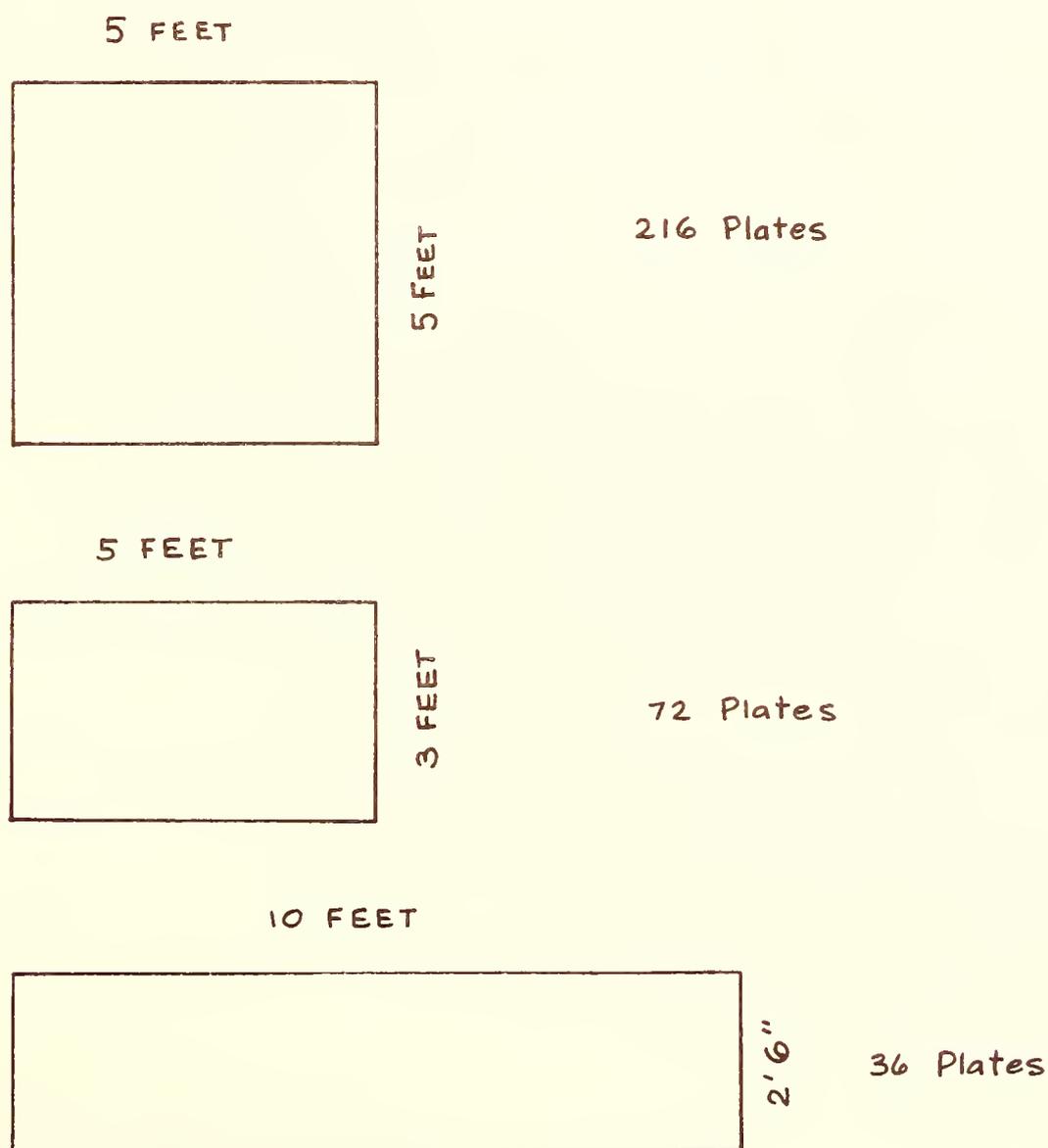
“Dear Sirs,

I am happy to inform you that the Secretary of the Navy at my earnest solicitation has permitted me to reduce the number of side armor plates of our battery from 6 to 5 courses, and to reduce the two nearest the wooden bulkhead. Accordingly, our amount will be as follows:

216 plates	5 x 5 feet	15/16" thick
72 plates	5 x 3 feet	15/16" thick
36 plates	10 x 2 1/2 feet	15/16" thick

Assuming the weight to be 40 [pounds] per [square] foot, which is more than it will prove, the amount will be as follows:

$$\begin{array}{r}
 216 \times 1000 = 216,000 \\
 72 \times 600 = 43,200 \\
 36 \times 1000 = 36,000 \\
 \hline
 295,200 \\
 \hline
 2240 = 132 \text{ tons, nearly}
 \end{array}$$



148. Specifications for Side Armor of the *Monitor*. [Transcribed by the author from the original] (Smithsonian Institution)

HYDROSTATIC CHARACTERISTICS

Numbers 149-154

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 149

Title: Midship Transverse Section of *Monitor* Hull

Date of Subject:

October 14, 1861

Draftsman/Life Dates:

Commodore Joseph Smith, USN
(1790-1877)

Medium: Pen and ink sketch on stationary.

Size [Sheet]:

10 inches by 8 inches (est.)

Size [Sight]:

1 5/8 inches by 3 3/4 inches (est.)

Inscribed:

Signature/Initials: "Jos. Smith"

Rendered: October 14, 1861

Original:

Location: American-Swedish Historical Foundation Museum

Identification: Papers of John Ericsson, Smith to Ericsson, October 14, 1861.

Condition: Good

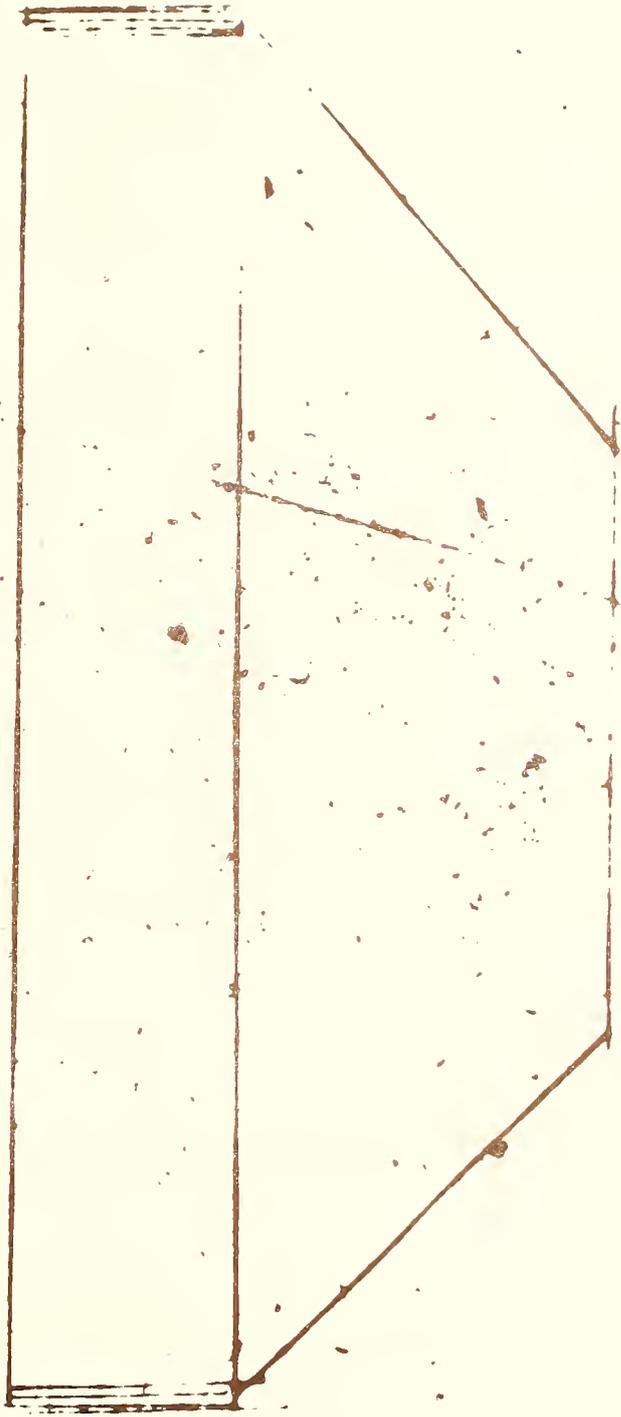
Publication:

The John Ericsson Papers, American-Swedish Historical Foundation Museum, Microfilm Edition, Philadelphia: Rhistoric Publications, 1970, reel 5.

Remarks:

This sketch is found on page 2 of Commodore Smith's "Private" letter of October 14, 1861, to John Ericsson questioning the bouyancy of the *Monitor* and expressing Smith's suggestion for increasing the size of the hull. His suggestion was rejected by Ericsson as unnecessary and too late.

Higher vessel than sea



When from the position of
the vessel the vessel is
the lower vessel to the

149. Midship Transverse Section of Monitor Hull (American-Swedish Historical Foundation Museum)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 150

Title: Mean Dimensions of *Monitor* Upper Hull

Date of Subject:

October 14, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pen and ink sketch on ruled stationary.

Size [Sheet]:

9 3/4 inches by 7 3/4 inches (est.)

Size [Sight]:

1 1/2 inches by 4 3/4 inches (est.)

Inscribed:

Notes:

"Beam 41 feet 4"/Mean length 141 feet/Extreme length as laid out 173 feet"

Signature/Initials: "J. Ericsson"

Rendered: October 14, 1861

Original:

Location: National Archives

Identification:

Record Group 71, Records of the Bureau of Yards and Docks, Entry E, Ltrs. Rec'd., Misc. Correspondents, Marked Pages, E65, Ericsson to Smith, October 14, 1861, p. 1.

Remarks:

This sketch is made on page 1 of Ericsson's letter of October 14, 1861, to Smith, which refutes the need to change the cross section of the hull.

Recd. Oct 16 1861

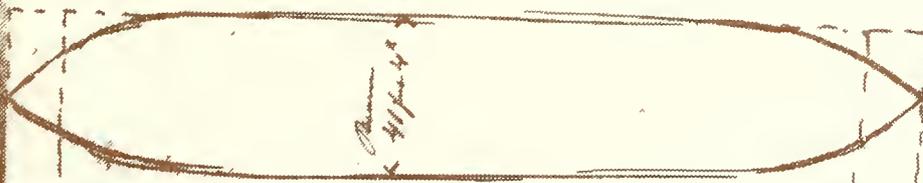
C. N. W. R.

60

New York - Oct. 14. 1861

Sir

Your private communication that
at 11 p.m. just reached me a few minutes
before the closing of the mail - a pencil
mark on the envelope indicates that the letter
convo has made a blunder - Please direct
95 Franklin Street, my residence for 18 years.
I will reply more fully to your letter
to morrow. I now simply beg to assure
you that there is not the slightest ground
for the absurd statements made in relation
to the hull, the displacement of which I
know within 500 pounds. The mean length of
the upper or flat portion of the vessel is
141 feet and the extreme beam is 41 feet 4 inches.



Mean length 141 feet

Extreme length as laid out 173 feet

Area by multiplying 141 by 41 $\frac{1}{2}$ we have 5827 Square feet
of area at water line. As the upper vessel is 5 feet
high we find by multiplying 5827 by $5\frac{1}{2}$ that the displacement
of upper vessel is 582 $\frac{2}{3}$ tons. The area of the mid-

150. Mean Dimension of Monitor Upper Hull (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 151

Title: "QUANTITY OF WATER DISPLACED"

Date of Subject:

October 16, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and ink on buff paper.

Size [Sheet]:

5 1/8 inches by 9 5/8 inches

Size [Sight]:

4 1/4 inches by 7 1/4 inches

Inscribed:

Title Block/Caption: "Quantity of water displaced on one side more than on the other 4243 cubic ft. = 121 tons."

Scale: "1/8 inch = one foot"

Notes: "Transferred from Bureau C & R Mar. (?) 1927. (Monitor)"

Rendered: ca. October 16, 1861

Original:

Location: National Archives

Identification:

Record Group 45, Naval Records Collection of the Office of Naval Records and Library, AD-Design and General Characteristics, U.S. Ships (Including *Monitor*). Box No. 6, Envelope AD - *Monitor*, U.S.S. (1861-1862).

Condition: Good

Remarks:

One of the sketches made by John Ericsson in the process of answering Commodore Smith's inquiry of October 16, 1861, concerning the transverse stability of the *Monitor*. This calculation shows the displacement resulting when the hull is heeled over until the deck edge is at water level. The notations indicate the values of various moment arms and forces involved in Ericsson's calculations.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 152

Title: Sketch of the Transverse Stability of the *Monitor's* Hull

Date of Subject:

October 16, 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Black and blue ink on white buff paper.

Size [Sheet]:

10 inches by 20 1/2 inches (est.)

Size [Sight]:

8 inches by 15 1/2 inches

Inscribed:

Scale: 3/8 inch = 1 foot (est.)

Notes: "Made by Capt. Ericsson/To illustrate extent of Monitor's rolling" [Pencil]

Rendered: October 16, 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 62(102)

Condition: Good

Remarks:

The sketch was made by John Ericsson to develop his data before replying to Commodore Smith's inquiry regarding the transverse stability of the *Monitor*. A "red" line represents the vertical through the center of the midship section, and two perpendicular "blue" lines intersect at the center of gravity. Heeling the vessel one foot at the extreme beam displaces the turret center of gravity by 3 inches and that of the vessel by 1 3/4 inches in opposition. This represents 83 tons of unbalanced displacement 11 1/2 feet from the centerline.



152. Sketch of the Transverse Stability of the Monitor's Hull (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 153

Title: "TRANSVERSE SECTION OF THE ERICSSON BATTERY"

Date of Subject:

October 1, 1861

Draftsman/Life Dates:

Unknown

Medium: Pen and ink on white buff paper.

Size [Sheet]:

10 5/32 inches by 20 5/8 inches (est.)

Size [Sight]:

9 1/4 inches by 19 9/16 inches (est.)

Inscribed:

Scale: "3/8 inch = 1 foot"

Notes:

"Recd. with letter from J. Ericsson dated 17 Oct. 1861"

"a. Center of Gravity of unbalanced displacement."

Rendered: Before October 16, 1861

Original:

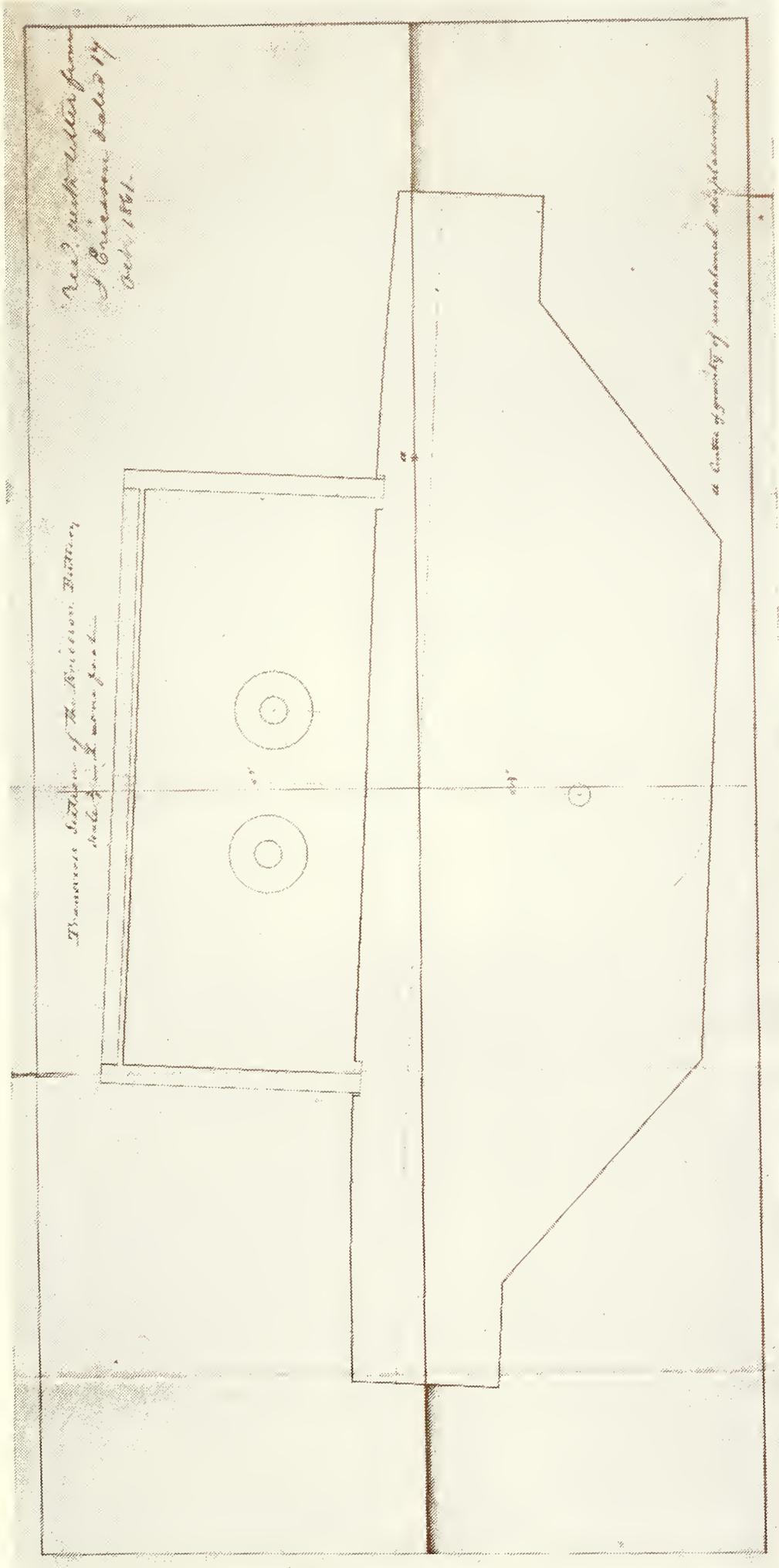
Location: National Archives

Identification:

Record Group 71, Records of the Bureau of Yards and Docks, Entry 5, Ltrs. Rec'd., Misc. Correspondents, Marked Pages, E72, Ericsson to Smith, Oct. 16, 1861, Encl., Rec'd. Oct. 17, 1861.

Remarks:

This drawing is an enclosure to Ericsson's letter of October 16, 1861, to Commodore Smith demonstrating the transverse stability of the hull. Ericsson shows that a weight of 860 tons placed on the water line just to the right of the edge of the turret at position "a" would cause the hull to heel one foot. To dramatize this inherent stability, Ericsson noted that this would be equivalent to 690 average-size men standing on the edge of the armor belt. Ericsson also mentioned that the righting arm of the hull and machinery was three times that of the turret.



153. "TRANSVERSE SECTION OF THE ERICSSON BATTERY" (National Archives)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 154

Title: Sheer Lines after Commissioning

Date of Subject:

February 26, 1889

Draftsman/Life Dates:

John Ericsson (1803-1889)

Size [Sheet]:

12 inches by 24 1/2 inches (est.)

Size [Sight]:

7 1/8 inches by 22 1/4 inches (est.)

Inscribed:

Scale: 1/2 inch = 1 foot (est.)

Notes:

"Feb. 26, all in but powder & Shell" [Pencil]

"Mean of both sides"

"Stern point level line"

"Aft Bulkhead"

"Propeller Well"

"Deck"

"Straight Line from Stem to Stern"

"Side"

"Centerline"

"W. L. Feb. 26 all in but powder and shell"

Signature/Initials: "Monitor/Made by Capt. Ericsson" [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: February 26, 1862

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 41(139)

Condition: Good

Remarks:

This drawing represents the deflection of the deck at the centerline and the edge at five stations without "powder and shell" as shown in the following table deduced from the dimensions in the drawing:

Station	Approx. Frame No.	Interval	Distance From Bow	Side Above Stern	Deck	Stem to	Deflection of Deck at:	
					Above Stern at Center	Stern Line Above Stern	Side	Center
Bow	—	0'	0'	19"	19"	19"	0	0
Forward Bulkhead	3	33'	33'	14 5/8"	18 5/8"	15 3/8"	- 3/4"	+ 3 1/4"
Midship	21	54'	87'	7 1/2"	11 1/2"	9 1/2"	- 2"	+ 2"
After Bulkhead	38	52'	139'	1 5/8"	5 5/8"	8 3/4"	- 2 1/8"	+ 1 7/8"
Stern	—	35'	174'	0	0	0	0	0

The diagram indicates that the stern was 13 inches above the waterline, making the bow 32 inches above water and the average freeboard amidships 22 1/2 inches, 4 1/2 inches above the design waterline of 18 inches. The interval indicated measured between the forward and after bulkheads, 106 feet, exceeds the distance on the drawings by one foot, thereby making the overall length of the hull an unexplained 174 feet instead of the traditional 173 feet.

The graph is also useful as it indicates that the longitudinal run of the flat of the deck extends from the forward bulkhead at frame 3 to the after bulkhead at frame 38.



154. Shear Lines after Commissioning (Stevens Institute of Technology)

STEERING GEAR

Numbers 155-157

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 155

Title: "BATTERY. PILOT HOUSE."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

21 7/8 inches by 18 inches (est.)

Size [Sight]:

19 1/2 inches by 15 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 inch = one foot"

Signature/Initials: "Monitor/Made by Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 40(112)

Condition: Good

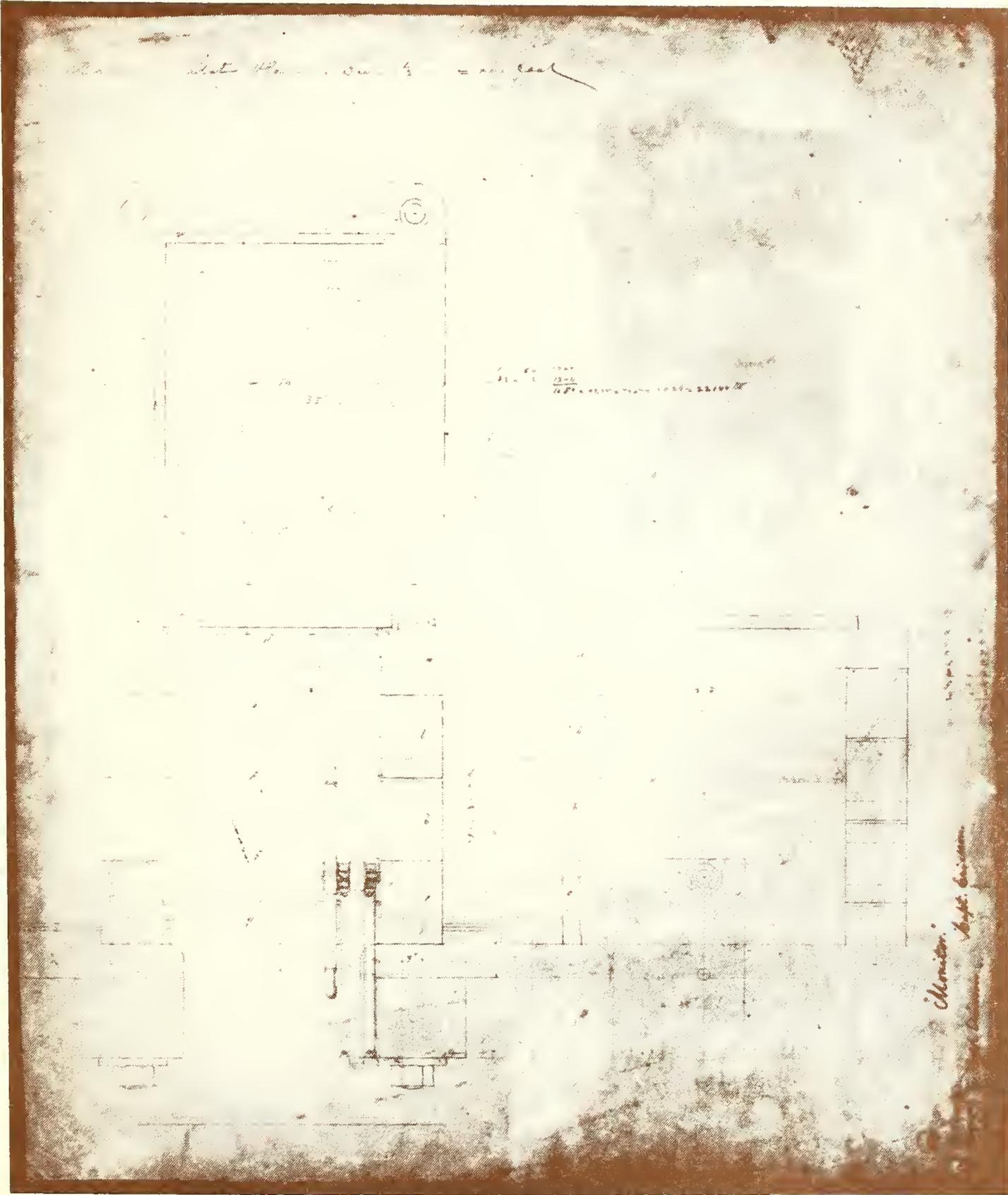
Remarks:

The pilothouse drawing shows the structure as being 60 inches wide, 50 inches long and 49 1/2 inches high, 3 inches of which is buried below the top of the armor deck. The structure is built of eighteen 12-inch-by-9-inch wide iron "logs" mortised at the corners and secured to the deck beams by four 3-inch-diameter 69-inch bolts. The logs are spaced 1/2-inch apart to allow for ventilation and observation. The level of an "average" observer's eyes is shown on the longitudinal and transverse sections of the pilothouse about 5 feet 4 inches above the pilothouse floor. The floor is about 28 inches below the top of the deck armor.

The deck beams under the pilothouse differ from those in the other parts of the ship. The beam under the forward side of the pilothouse is 10 inches high and 12 inches wide, while the beam under the after edge is 10 inches by 14 inches wide.

The logs are designated by size:

Symbol	No.	Location	Size
a.	2	Fore, aft top	60" x 9" x 12"
b.	4	Fore, aft 2nd, 3rd	60" x 9" x 12"
c.	2	Fore, aft bottom	60" x 9" x 12"
d.	2	Port, stbd top	50" x 9" x 12"
e.	2	Port, stbd 2nd	50" x 9" x 12"
f.	4	Port, stbd 3rd, 4th	50" x 9" x 12"
g.	2	Port, stbd bottom	50" x 9" x 12"



155. "BATTERY. PILOT HOUSE." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 156

Title: "BATTERY. STEERING GEAR."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

17 3/4 inches by 42 1/4 inches (est.)

Size [Sight]:

17 inches by 37 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "Full size"

Notes:

"9.4 inches of rope per turn of wheel"

"18" motion of rope from center to side."

Signature/Initials: "Made by Capt. Ericsson/Monitor" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

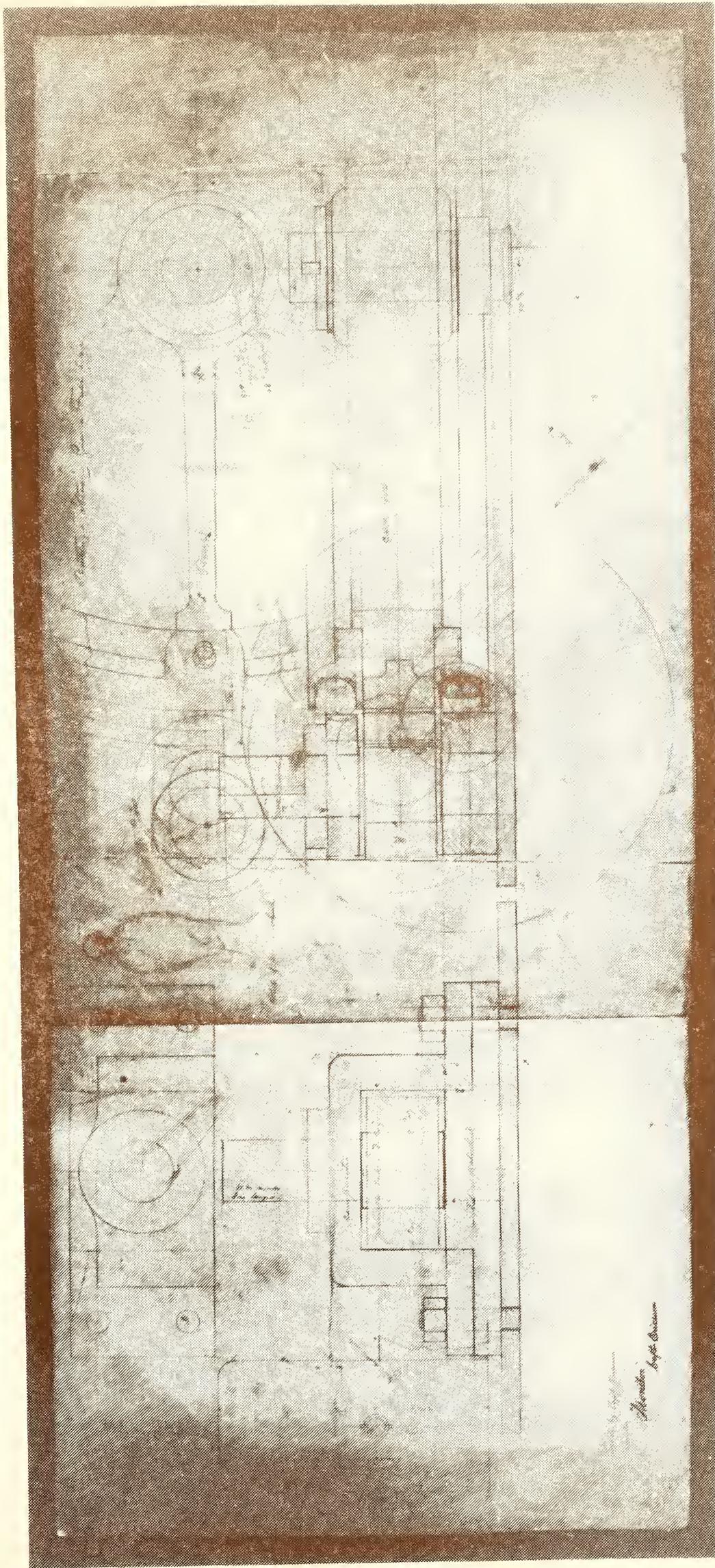
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 60(147)

Condition: Good

Remarks:

This drawing shows the central bearing, gear train, six-spoke steering wheel, dual-track rope sheave, and the amidship rung.



156. "BATTERY. STEERING GEAR." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 157

Title: " 'BATTERY.' TILLER"

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and blue ink on buff paper.

Size [Sheet]:

15 1/2 inches by 23 3/4 inches (est.)

Size [Sight]:

13 inches by 19 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes: "Wrought Iron. Rough."

Signature/Initials: "Monitor/C. W. M."
" 'Monitor'/C. W. M."

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 66

Condition: Good

Remarks:

This drawing shows the rudder tiller and the 65-degree sector to carry the tiller ropes.

NAVIGATION EQUIPMENT

Numbers 158-159

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 158

Title: "BATTERY. STOP COCK AND PIPE FOR SOUNDING APPARATUS"

Date of Subject:

ca. November 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

24 inches by 12 inches (est.)

Size [Sight]:

22 3/8 inches by 10 1/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes: "This opening to be made bell formed all around"

Signature/Initials: "Monitor/Capt. E." [Pencil]

"'Monitor'/Sounding Apparatus Details/Capt. Ericsson" [Ink]

Rendered: ca. November 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 58(124)

Condition: Poor

Remarks:

The device shown is the pipe and stopcock through which the "sounding instrument" (see Catalog Drawing 159) is lowered from within the hull. This technique was recommended by Stimers to Ericsson¹ while the ship was under construction. From the slant of the opening, the pipe must have been connected to the sloping side of the vessel; and it would be presumed to have been up forward, possibly in the anchor hoister room, where the depth information would be available to the captain in the pilothouse.

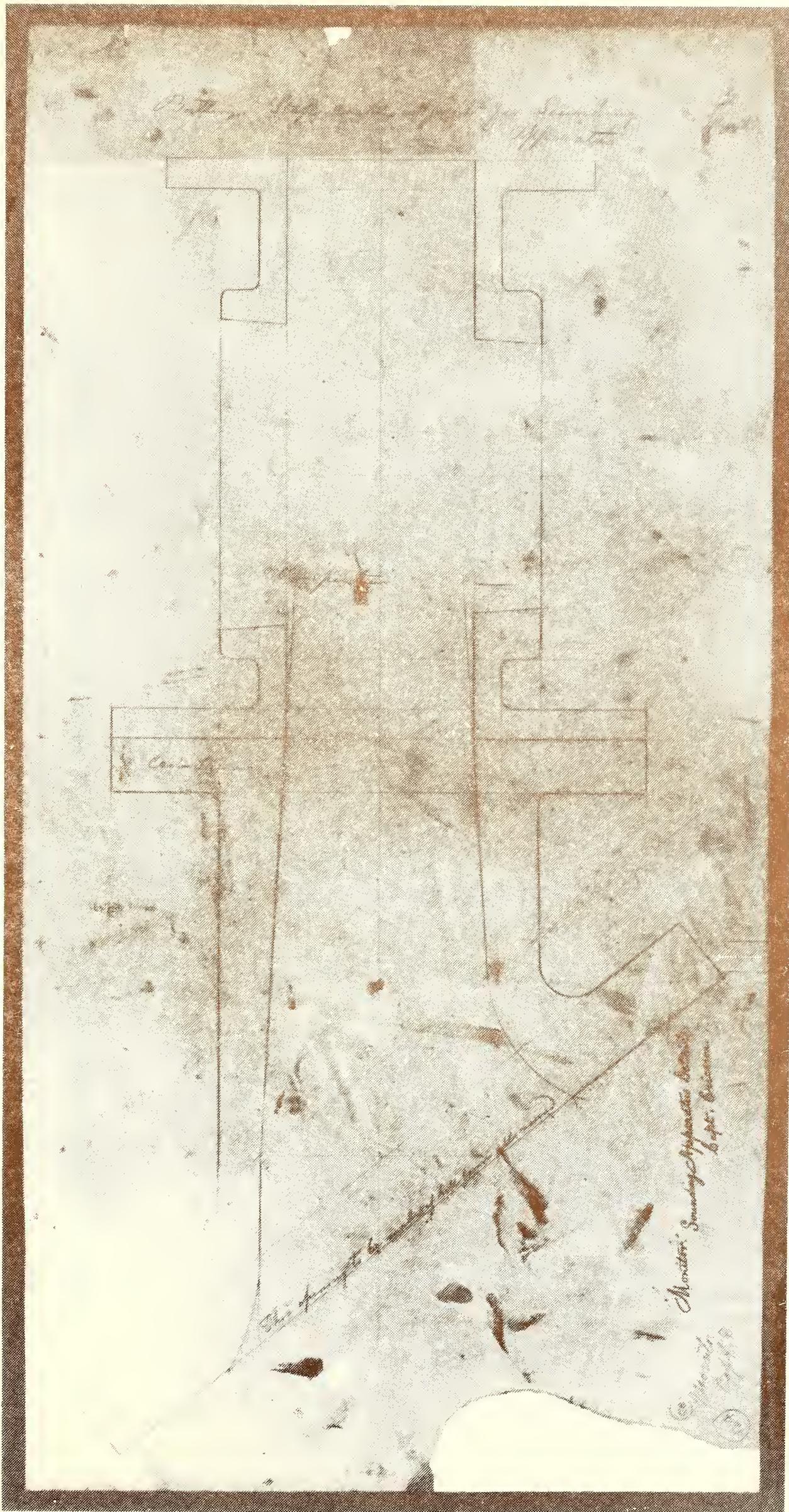
There must have been a chamber above the stopcock or a standpipe that would allow the apparatus to be lowered with a line. The opening of the standpipe would have

to be above the waterline to prevent water from flooding in while the depth was being measured. A sheave above the pipe would have been useful for hoisting and lowering the instrument.

Assuming the drawing is full scale and the throat of the pipe is 3 inches in diameter, the pipe would be 21 inches high and the hull flange 12 1/2 inches in diameter.

Footnote:

¹ Stimers to Smith, November 17, 1861, National Archives, Record Group 71.



158. "BATTERY. STOP COCK AND PIPE FOR SOUNDING APPARATUS"
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 159

Title: Ericsson's Improved Sounding Instrument

Date of Subject:

ca. late 1850's (est.)

Draftsman/Life Dates:

Endicott & Co.

Medium: Lithograph

Size [Sheet]:

14 inches by 8 1/2 inches (est.)

Size [Sight]:

11 3/4 inches by 5 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Notes: "1/2 size of Instrument — price \$20."

Signature/Initials: "Lith of Endicott & Co. N York"

Rendered: ca. late 1850's (est.)

Original:

Location: The John Ericsson Papers
American-Swedish Historical Foundation Museum

Condition: Excellent

Publication:

John Ericsson Papers, American-Swedish Historical Foundation Museum, Philadelphia:
Rhistoric Publications, Inc., 1970, reel 3.

Remarks:

This device measured water depth as a function of pressure. A cavity in the bottom held tallow to determine the nature of the bottom. The original description of the instrument is attached to these remarks.

Notes on the back of the printed description are itemized:

"James [Stogg ?] Agent"
"c/o Messers. E. & G. H. Blunt
17 Water St., New York"

“Drawing of Improved Sea Lead — 2 Tubes”
“Ericsson claims lead used by Thomson[?] on CHALLENGER Expedition
of the [same] principle.”

ERICSSON'S IMPROVED SOUNDING INSTRUMENT.

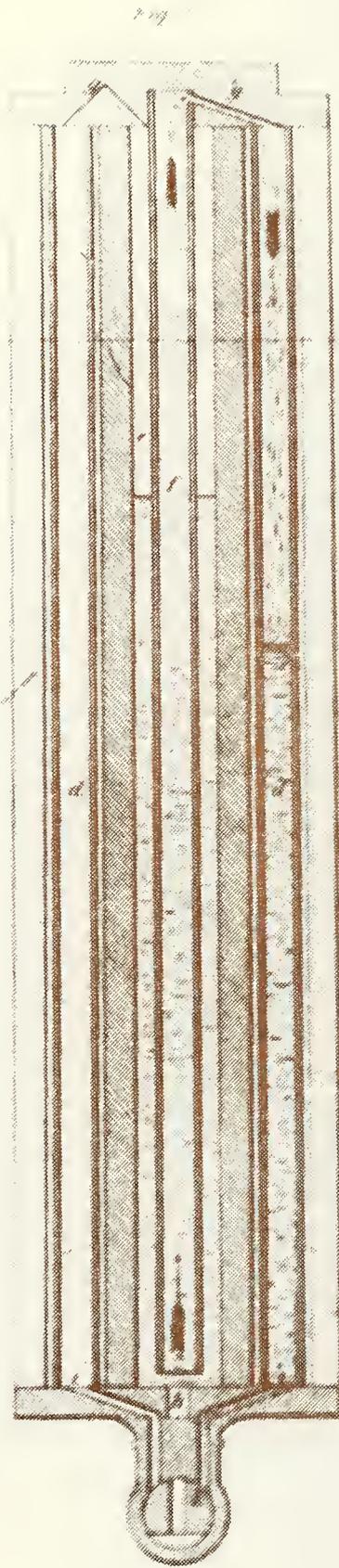
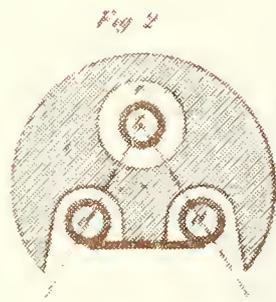
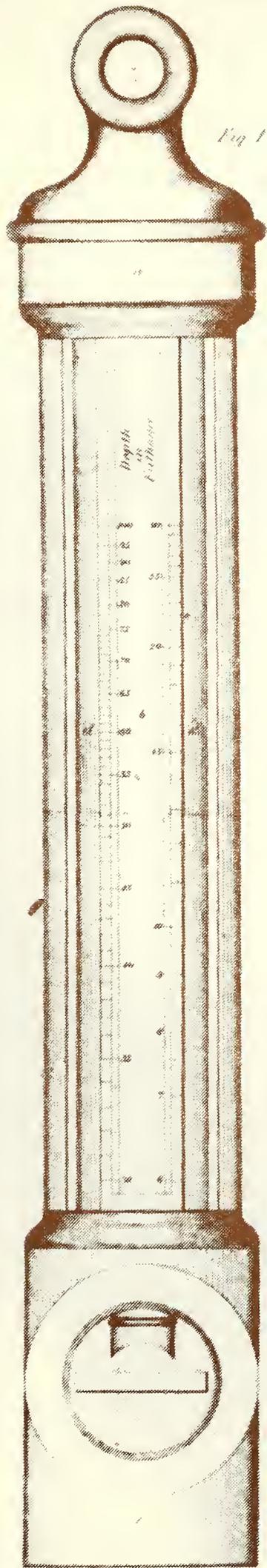
The object of this Instrument is that of taking soundings at sea without rounding the vessel to the wind, and independently of the length of the lead-line. It has stood the test of practice for more than thirteen years, both in the British and American mercantile and naval marine, being especially approved of, and used by the Hydrographical Bureaus of each Government.

The indications of this Instrument are based upon the compression of the air contained within it, by the pressure of the sea, which for each succeeding fathom in depth increases in a practically considered direct ratio. Fig. 1. is a front elevation, Fig. 2. a horizontal section, and Fig. 3. a developed vertical section on the dotted lines in Fig. 2. The same letters refer to the same parts in each figure respectively.

The Instrument consists of three principal parts: the cap, *a.*; the stem, *b.*; and the base, *c.* In the stem, *b.*, are two chambers, (*e.* and *f.*) one within the other, communicating, each, by means of the small passages *g.* *g'* with two glass tubes *d.* *d'*; these glass tubes communicating at the opposite end with the discharge-cock *k.* by means of the two passages *i.* *i'*. Upon the instrument being lowered into the sea, the water enters by an orifice *h.* behind the discharge-cock, and rises in the two chambers *e.* and *f.* but rises faster in the latter on account of its smaller capacity, the air contained in it being compressed within the glass tube *d'*. When it has descended about five fathoms, the whole of the air in *f.* will have passed into the glass tube *d'*, after which the water will enter and gradually rise in the tube, so that it will stand as marked on the index plate in Fig. 1. For each succeeding fathom, the air will resist the pressure of the water in an inverse ratio of the contents above the water-line, and accordingly the spaces on the index plate marking fathoms, will gradually become less. The contents of the chamber *e.* being much greater than that of *f.*, the air in it will not have become sufficiently compressed to admit water into the glass tube *d.* until the instrument has reached a depth of about twenty-five fathoms. In consequence of this, the scale of the latter tube will afford more distinct indications of great depth, whilst the opposite scale affords indications for small depths not marked by the former. The instrument being hauled in, the height of the water in the glass tubes indicates the number of fathoms below the surface of the sea reached by the instrument. By means of tallow, held by a cavity in the base in the usual manner, it will be seen whether the lead had touched bottom or not. As soon as the depth has been read off, the stop-cock *k.* should be turned, so as to let the water out of the glass tubes. Before again using the instrument, the cock should be returned to its former position.

DIRECTIONS FOR USING THE LEAD.

BEFORE using the Lead, turn the handle of the stop-cock so as to stand across the instrument with the mark X upwards: on hauling in the lead, keep it in an upright position until the depth is read off, as indicated by the height of water in the glass tubes—then turn the cock so as to place the X downwards in order to allow the water to run out in this position close the cock until the Lead is again wanted.



159. Ericsson's Improved Sounding Instrument (American-Swedish Historical Foundation Museum)

TURRET

Numbers 160-182

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 160

Title: " 'BATTERY.' TURRET BRACES"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, red, and brown ink on paper.

Size [Sheet]:

18 1/2 inches by 25 1/2 inches (est.)

Size [Sight]:

15 1/2 inches by 24 1/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 inch = 1 Foot"

Notes: "R. R. [railroad] iron 27 lbs per foot" [Written on top of turret]

Signature/Initials: "Monitor" [Pencil]

" 'Monitor.' 1861/C. W. MacCord" [Ink]

Rendered: ca. November 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 20(103)

Condition: Excellent

Remarks:

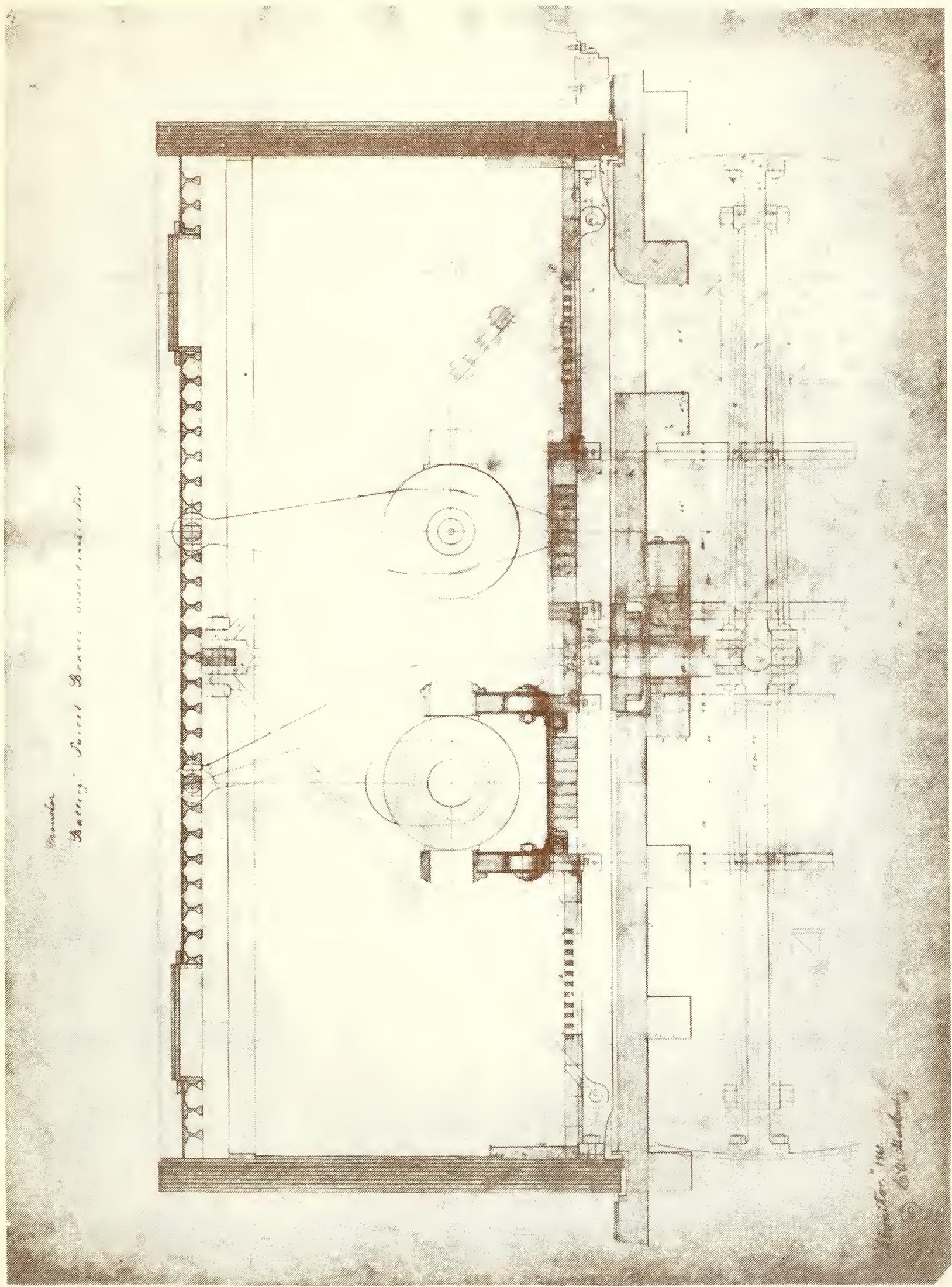
This drawing shows the transverse section of the turret looking to port from starboard, forward being to the right and a plan view of the main turret beam, gun slides, and diagonal braces. The turret is trained with the gun ports to port. The left side of the turret shows a section through the gun in battery with the port stopper open. The right side of the turret shows the gun withdrawn from the port and the port stopper closed. A turn-buckle is sketched in pencil on the forward diagonal brace.

The turret deck is 4 inches thick by 7 1/2 inches wide planking. Four gratings are shown in the turret deck outboard of the guns and on both sides of the main deck beam.

The turret overhead hatches run parallel to the gun axes. The position of the upper bearing of the turret shaft is shown in relation to the deck beams.

There appears to be a hole in the pendulum of each port stopper, tapering from 6 inches in diameter on the inside to 1-inch on the outside. The funnel shape may assist in inserting the rammer-and-sponge staff during loading operations. This hole may also be used as a means for bolting on the port bucklers.

The inner 1-inch course of the turret bulkhead is 1/2-inch below the outer courses, so only one thickness bears on the brass deck ring.



Battery Turret Braces and Detail

Wm. H. ...

160. " 'BATTERY.' TURRET BRACES" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 161

Title: Turret Transverse Section Through Centerline Parallel to the Diagonal Braces

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue and brown ink on paper.

Size [Sheet]:

19 1/4 inches by 25 1/4 inches (est.)

Size [Sight]:

10 1/2 inches by 21 inches (est.)

Inscribed:

Scale: 1 inch = 1 foot (est.)

Rendered: ca. November 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 67(64)

Condition: Excellent

Publication:

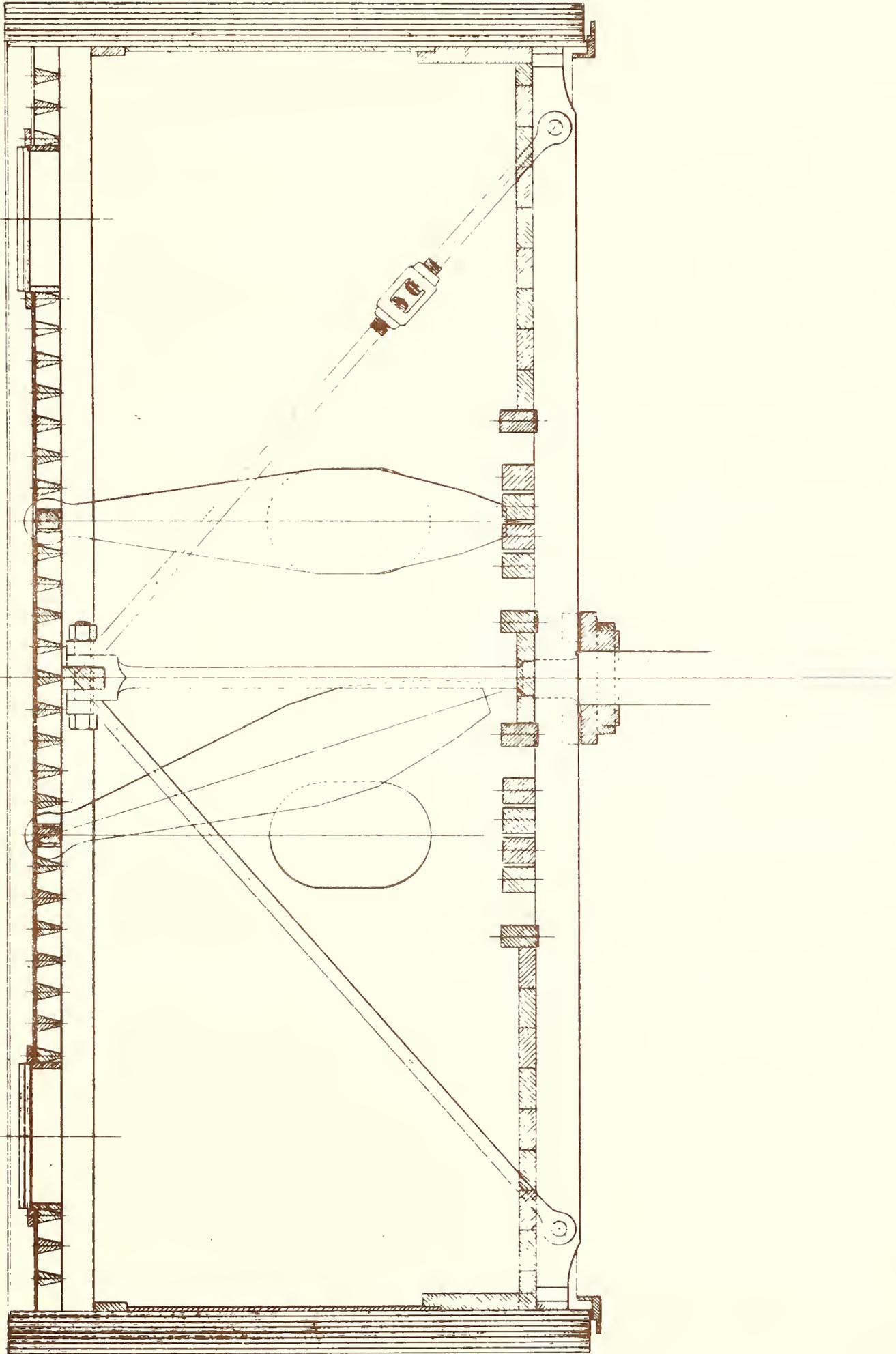
Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 48.

Remarks:

This transverse section of the inside turret shows the left port stopper open and the right stopper closed.

The cross section of the roof iron has a single triangular shape rather than that of railroad iron. There are no hatches shown in the turret deck, so the section must be through the exact center of the turret.

This drawing may have been made to show the addition of a turnbuckle on the diagonal brace.



161. Turret Transverse Section Through Centerline Parallel to Diagonal Braces
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 162

Title: Transverse Section of the Turret and Plan of the Diagonal Braces

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Photoengraving

Size [Sheet]:

3 7/8 inches by 6 3/4 inches

Size [Sight]:

3 1/16 inches by 6 1/2 inches

Inscribed:

Title Block/Caption: "Top illustration shows the turret and the pendulums which swing over the gun ports"

Rendered: ca. October 1861 (est.)

Original:

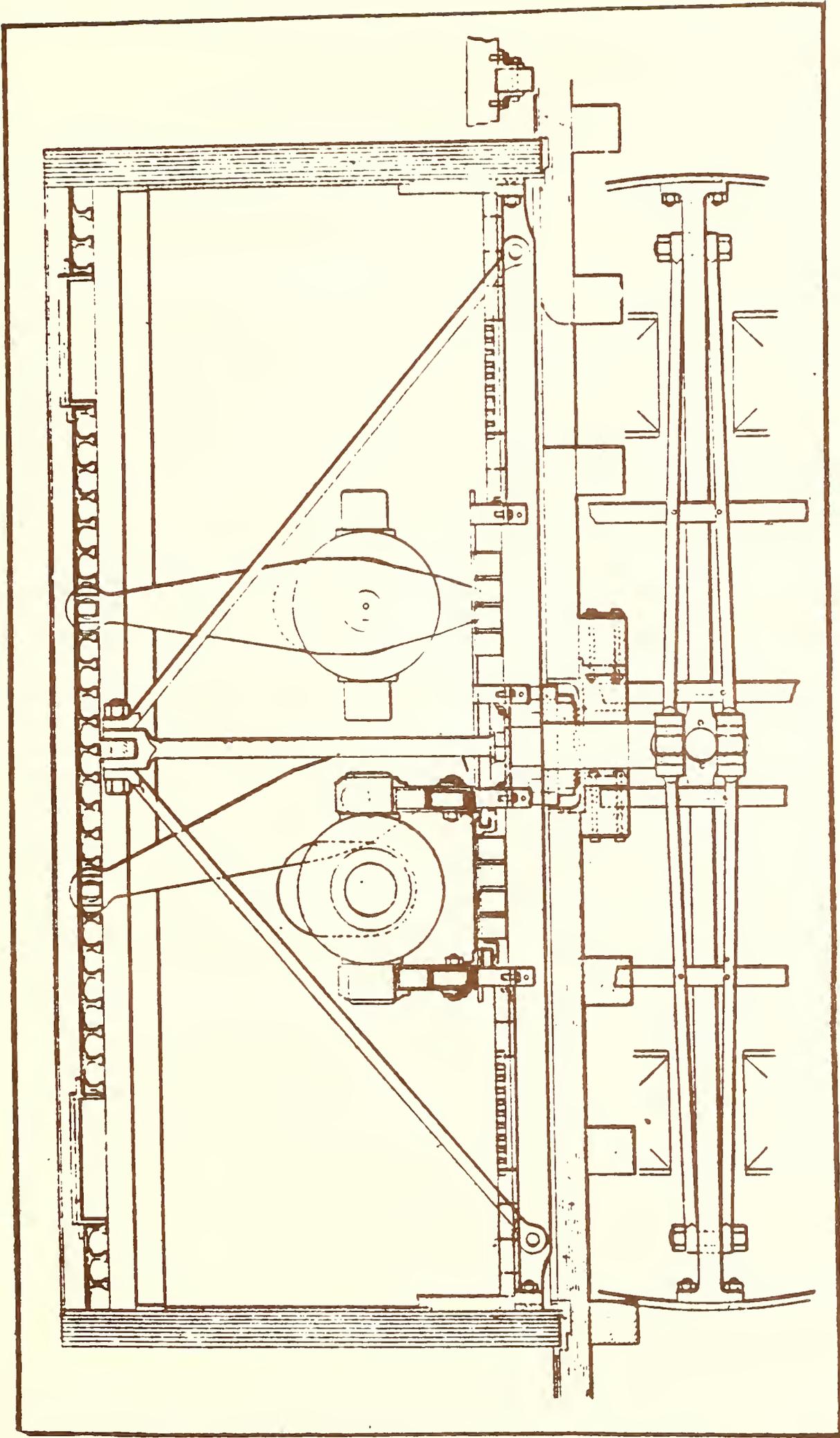
Publication:

George Allenson, "The Monitor," *Model Craftsman*, 5, (February, 1937), p. 10.

Frank M. Bennet, "The United States Ironclad, 'Monitor'," *Cassier's Magazine*, XIII, (April, 1898), p. 472.

Remarks:

This drawing appears to be identical to Catalog Drawing 160 with the exception of the omission of the turnbuckle on the right-hand diagonal brace. On this basis the drawing should represent an earlier version of the turret. Allenson gives no source for these *Monitor* drawings.



162. Transverse Section of the Turret and Plan of the Diagonal Braces (Model Craftsman)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 163

Title: "TRANSVERSE SECTION OF THE TOWER AND LONGITUDINAL SECTION OF ONE PART OF THE SHIP"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black and white photograph.

Size [Sheet]:

8 inches by 10 inches

Size [Sight]:

6 inches by 6 1/2 inches

Inscribed:

Title Block / Caption: "TVÄR SECTION AF TORNET OCH LÄNG SECTION AF EN DEL AF FARTYGET"

Scale: 3/8 inches = 1 foot (est.)

Notes:

This drawing bears the stamp of a Swedish museum in reverse:

"KRIGSARKIVET"

"30/1957"

"Utländska Fartyg

"Kra. N^o 1:3 Box U.2.

Sjöh Mus. Arkiv Ö"

R N:r 4724:4"

Original:

Location: Division of Naval History
Smithsonian Institution

Identification: Photographic Negative 362815

Condition: Excellent

Publication:

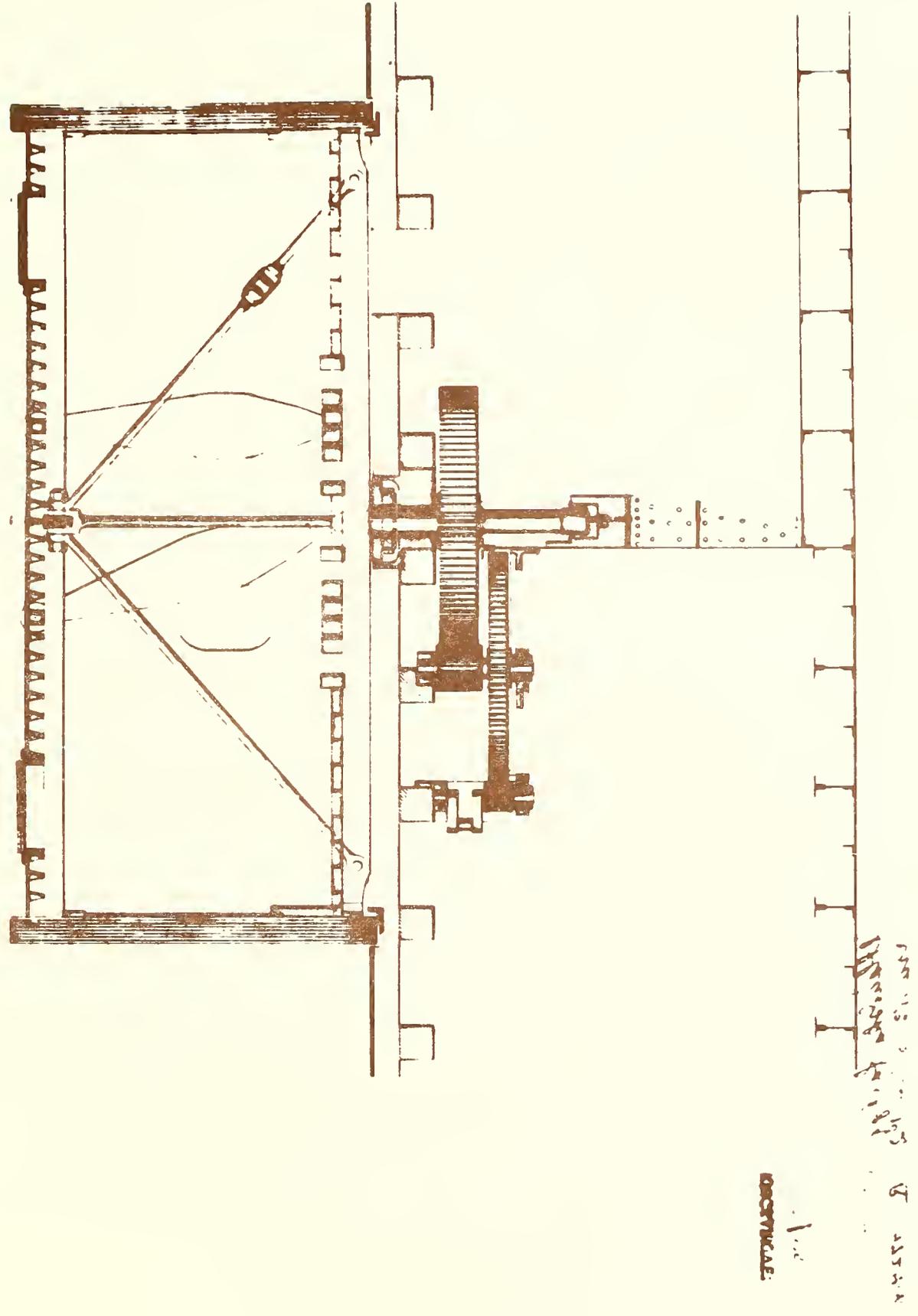
"The Elusive Ironclad, *Monitor*," *Sea Classic*, 7, (September, 1974), p. 36, fig. 2.

Remarks:

This drawing is one of four acquired by Dr. Lundeberg from the Swedish War Archives in Stockholm in the early 1960s. The drawing of the turret bears a close resemblance to the rendition of Catalog Drawing 161. The unique feature of this drawing is the fine detail of the turret gear train and the riveting of the strut that supports the turret shaft and key.

Monitor.

Svar Section af Tornet och HängSection af en del af Sartyget.



TECHNICAL

1861
Smithsonian Institution
Washington

163. "TRANSVERSE SECTION OF THE TOWER AND LONGITUDINAL SECTION OF ONE PART OF THE SHIP" (Smithsonian Institution)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 164

Title: Turret Details; Roof, Floor Beams, Hatches, Gun Slides, Pendulum Bearings, Bulkhead Armor and Smoke Box

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

20 1/2 inches by 28 inches (est.)

Size [Sight]:

18 5/8 inches by 27 3/4 inches (est.)

Inscribed:

Scale: 3 inches = 1 foot [estimated for gun and main beam]
3/4 inches = 1 foot [estimated for turret sections]

Notes: "6.' 9 1/2 clear head room" [in turret]

Signature/Initials: "Monitor (Turret Section)/Capt. E." [Pencil]
" 'Monitor.'/Turret Details/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 59(124)

Condition: Good

Publication:

Edward M. Miller, *U.S.S. Monitor, The Ship That Launched a Modern Navy*, Annapolis: Leeward Publications, Inc., 1978, p. 28.

Remarks:

This "collage" of turret details shows a transverse section of the gun, slides, main turret beam, diagonal brace, armor details, and roof construction, including a 1/2-inch plate floor and roof; and three plan views of the turret. The top, central plan view shows the roof of the turret with the hatch open and the hatch covers slid to the rear of the turret. The right plan view appears to be a trial in the roof beam construction, which does not coincide with most of the *Monitor* drawings. The left plan view shows the guns in and out of battery, the suggestion of a smoke box for the guns, and hatch arrangements for passing shell into the turret. One auxiliary view shows freehand sketching of the elevation of the pendulum bearing and an indication of what may be the "nose thimble" of Catalog Drawing 170.



164. Turret Details: Roof, Floor Beams, Hatches, Gun Slides, Pendulum Bearings, Bulkhead
Armor And Smoke Box (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 165

Title: Turret Details: Gun Ports and Turret Rope Stanchion Brackets

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue, and red ink on paper.

Size [Sheet]:

21 1/2 inches by 29 1/2 inches (est.)

Size [Sight]:

19 5/8 inches by 25 7/8 inches (est.)

Inscribed:

Scale: 1/2 inch = 1 foot [estimated for turret]
Full [estimated for stanchion bracket and bolts]
1 1/2 inch = 1 foot [estimated for nut guard]

Signature/Initials: "Monitor/C. W. M." [Pencil]
" 'Monitor'/C. W. M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

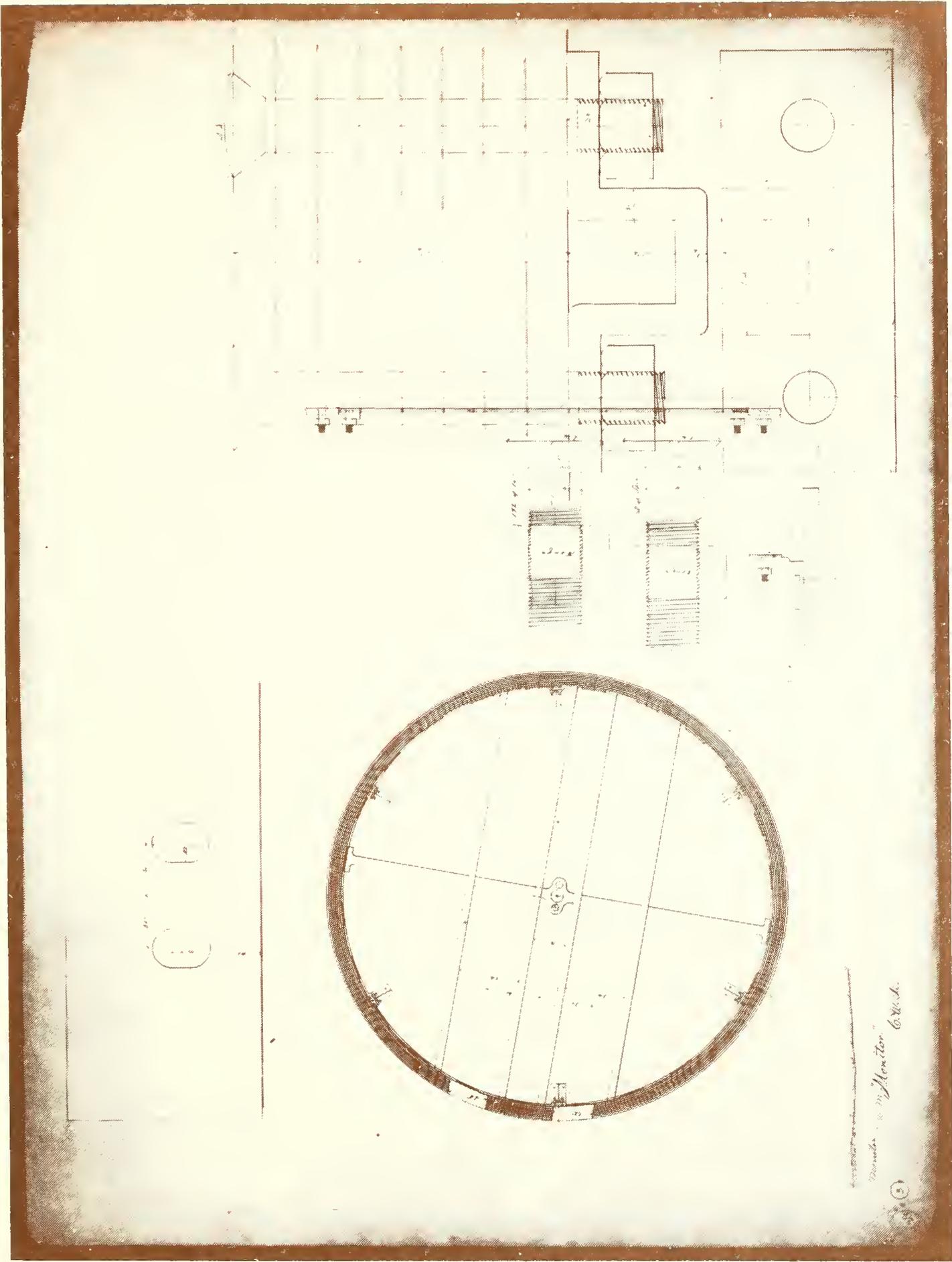
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 3(129)

Condition: Excellent

Remarks:

This "collage" shows a front and top view of the turret, locating the gun ports, slides, and a top and front view of the turret rope and awning stanchion bracket. A sectional view of the turret bulkhead indicates the thickness as 7 3/4 inches, indicating that the eight turret plates were probably 15/16 inches thick rather than 1-inch. A ninth plate of 3/4-inch thickness and 6-feet-4-inches high was bolted inside the bulkhead between the roof and deck support rings. There appear to be twenty-four of these, approximately 15 inches wide; they probably spanned the butt joints of the inner course of armor. The function and location of the six angle brackets is not clear.



165. Turret Details: Gun Ports and Turret Rope Stanchion Brackets
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 166

Title: "BATTERY. TURRET FLOOR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, red and orange ink on tracing cloth.

Size [Sheet]:

12 1/2 inches by 12 3/8 inches

Size [Sight]:

10 5/8 inches by 10 5/8 inches

Inscribed:

Title Block/Caption: See title.

Scale: "1/2 inch = 1 foot"

Rendered: ca. October 1861 (est.)

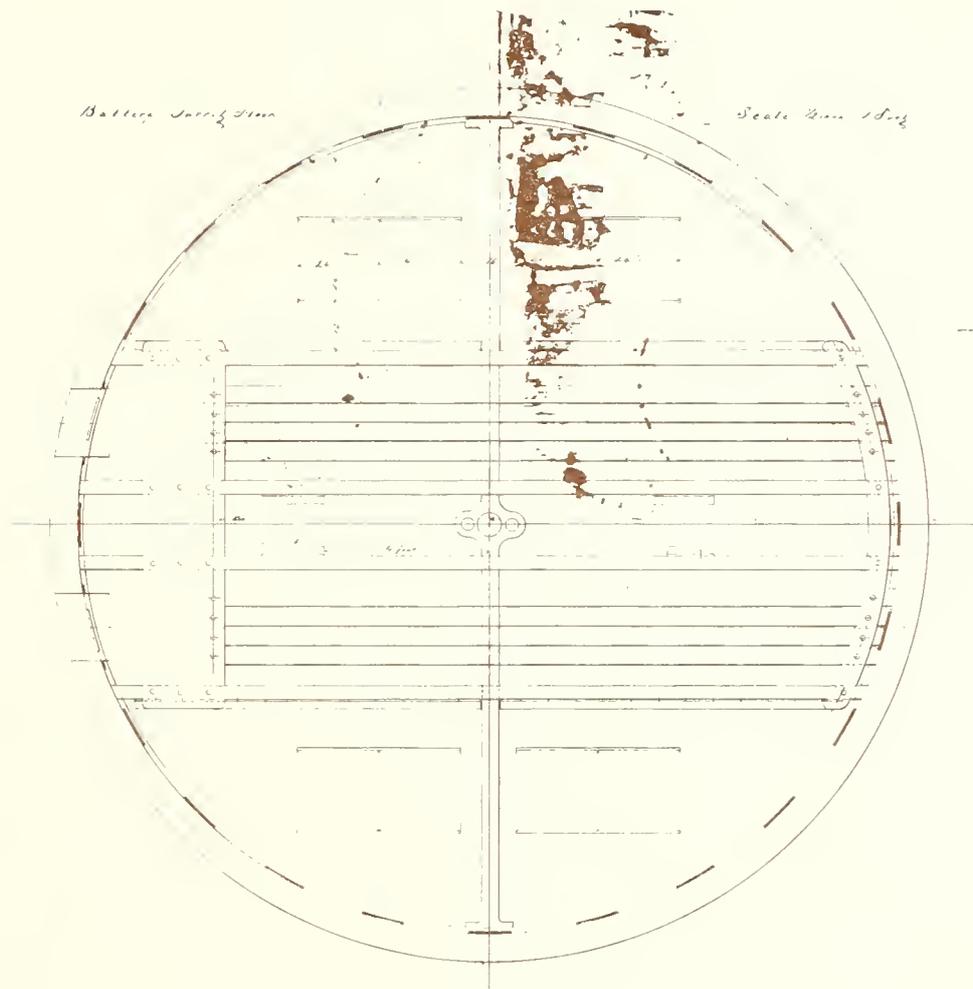
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good, but stained.

Remarks:

This drawing shows a plan view of the gun compressor rails, the tie plates, the main beam, and the floor hatches.



166. "BATTERY. TURRET FLOOR" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 167

Title: "TURRET BEAMS"

Date of Subject:

ca. October 1861

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

22 3/8 inches by 25 1/2 inches (est.)

Size [Sight]:

19 1/2 inches by 21 1/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: 1 inch = 1 foot (est.)

Signature/Initials: "Monitor/Capt. E." [Pencil]

"'Monitor'/Turret Details/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 57A(126)

Condition: Good

Remarks:

This drawing shows the details of the turret beams. Proceeding from the top of the drawing down:

Pendulum Beam (top and side view) — "19 feet 5 inches extreme length, 2 of this. Wrought Iron, neatly forged. [Ends] turned."

Main Beam (top and side view) — "19 feet 9 1/2 inches."

Center Roof Beam (top and side view) — "20 feet. One of this."

Inner Gun Slides (top and side views) — "19 feet 11". 2 of this."

Outer Gun Slides (side view) — "18 feet 5". 2 of this."

Roof Inner Cross Beam (top and side views) — "9 feet 10". 4 of this."

Roof Outer Cross Beam (side view) — "8 feet 1 1/2". 4 of this."

The drawing indicates that the roof cross beams are in two sections.



167. "TURRET BEAMS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 168

Title: “ ‘BATTERY.’ TURRET BRACES”

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black, blue and red ink on paper.

Size [Sheet]:

12 1/2 inches by 39 inches (est.)

Size [Sight]:

11 1/4 inches by 38 1/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: “3 ins. = 1 Foot”

Notes: “Wrought Iron. Polished. Four of This. Two right and Two Left.”

Signature/Initials: “Monitor/C.W.M.” [Pencil]
“ ‘Monitor’/C.W.M.” [Ink]

Rendered: ca. November 1861 (est.)

Original:

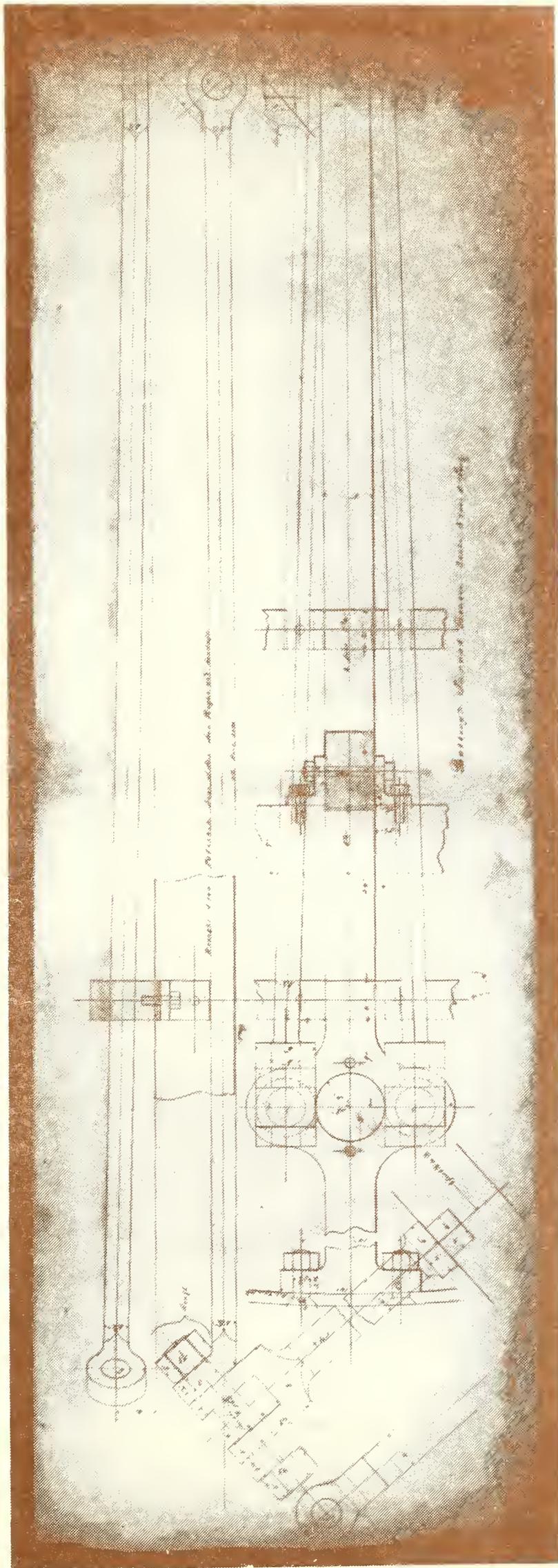
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 48

Condition: Excellent

Remarks:

This drawing shows the top and side views of the turret's 2 1/2-inch-diameter diagonal braces. An auxiliary view shows one of the two vertical center stanchions of the turret. Two views of the angle brackets that secure the gun slides to the main beam are presented.



168. "BATTERY TURRET BRACES" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 169

Title: "BATTERY — TURRET ROOF GUIDE PIECES — 90 PAIRS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

12 1/2 inches by 15 1/2 inches (est.)

Size [Sight]:

10 5/8 inches by 12 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full Size (est.)

Notes: "Cast Iron"

Signature/Initials: "Monitor/Capt. E." [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 33(86)

Condition: Excellent

Remarks:

These guide pieces are riveted on each side of the roof rails to keep them separated.



169. "BATTERY — TURRET ROOF GUIDE PIECES — 90 PAIRS"
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 170

Title: " 'ERICSSON BATTERY.' NOSE THIMBLES (FOR PENDULUM BEAMS OF TURRET ROOF)"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord¹
(1836-1915)

Medium: Black, blue, and red ink on tracing cloth.

Size [Sheet]:

22 inches by 15 1/2 inches (est.)

Size [Sight]:

19 5/8 inches by 12 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "Full Size"

Notes:

"Monitor"

"Pendulum used only on original Monitor- Mr. B. K. Rogers/Upper Montclair, N. J./Apr. 14, 1933."

[The latter statement is preceded by "?"]

Rendered: ca. November 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 6(96)

Condition: Excellent

Remarks:

These thimbles may have been used to support the end of the pendulum beams and to prevent the pendulums from riding forward against the turret bulkhead. Another beam would have been required to connect the two pendulum beam ends and support both thimbles. There are no positive indications of such a device on the drawings of this catalog except for the sketch in Catalog Drawing 164, and its presence will have to be determined by examination of the wreck.

Footnote:

¹ The draftsman is not identified, but the handwriting in the title and the weighting of the lines of the drawing are identical to those used by MacCord.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 171

Title: Turret Deck Ring and Details

Date of Subject:
ca. October 1861 (est.)

Draftsman/Life Dates:
John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:
21 inches by 32 1/2 inches (est.)

Size [Sight]:
16 3/8 inches by 32 1/2 inches (est.)

Inscribed:
Scale: Full (est.)

Notes:

"Upright piece/1 x 12 inches" [Ceiling on inner turret bulkhead above floor]
"Floor plate" [1/2 inch thick above the main deck beam]
"Trador hägs" [?] [on deck line]
"Talgas hamper hur" [?] [on deck ring]
e.g. = 320 lbs. ["square" symbol] inch torniti nigt [and?] (64 + 12 = 240,000
÷ 768 = 320)"
"Ing junto Smaujor[?]" [on deck ring]

Signature/Initials: "Monitor/Capt. E." [Pencil]
" 'Monitor'/Turret Details/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

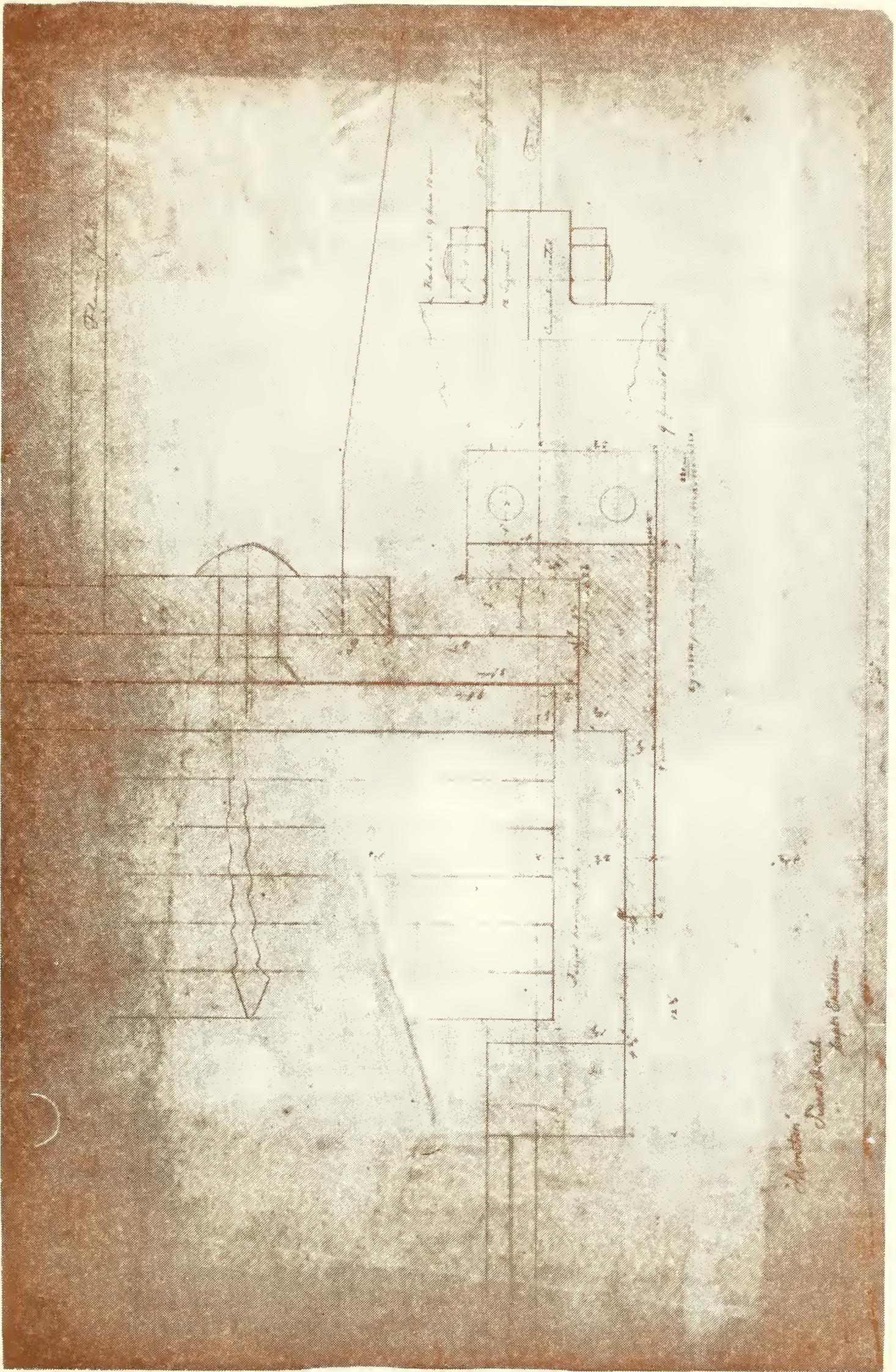
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 57B(130)

Condition: Good

Remarks:

This drawing features a transverse section of the turret brass deck ring segment and the flange joints that couple the twelve segments together. The eight courses of the turret armor and a 1-inch-by-12-inch upright piece that guards the inside of the turret above the turret floor are shown. The notes in a foreign language are indistinct and require translation. The draftsman has calculated the ring to weigh 2,661 pounds.



171. Turret Deck Ring and Details (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 172

Title: "BATTERY. TURRET BRACES"

Date of Subject:

Post-June 1862 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

15 5/8 inches by 21 1/8 inches (est.)

Size [Sight]:

14 inches by 19 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (estimated, top view)
"3 ins. = one foot" (bottom view)

Notes:

"Cast iron"
"cored" [1 inch diameter bolt holes to be reamed]
"Top" [moulded end]
"Bottom" [plain end]

Signature/Initials: "Monitor/Made by Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: Post-June 1862 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 46(105)

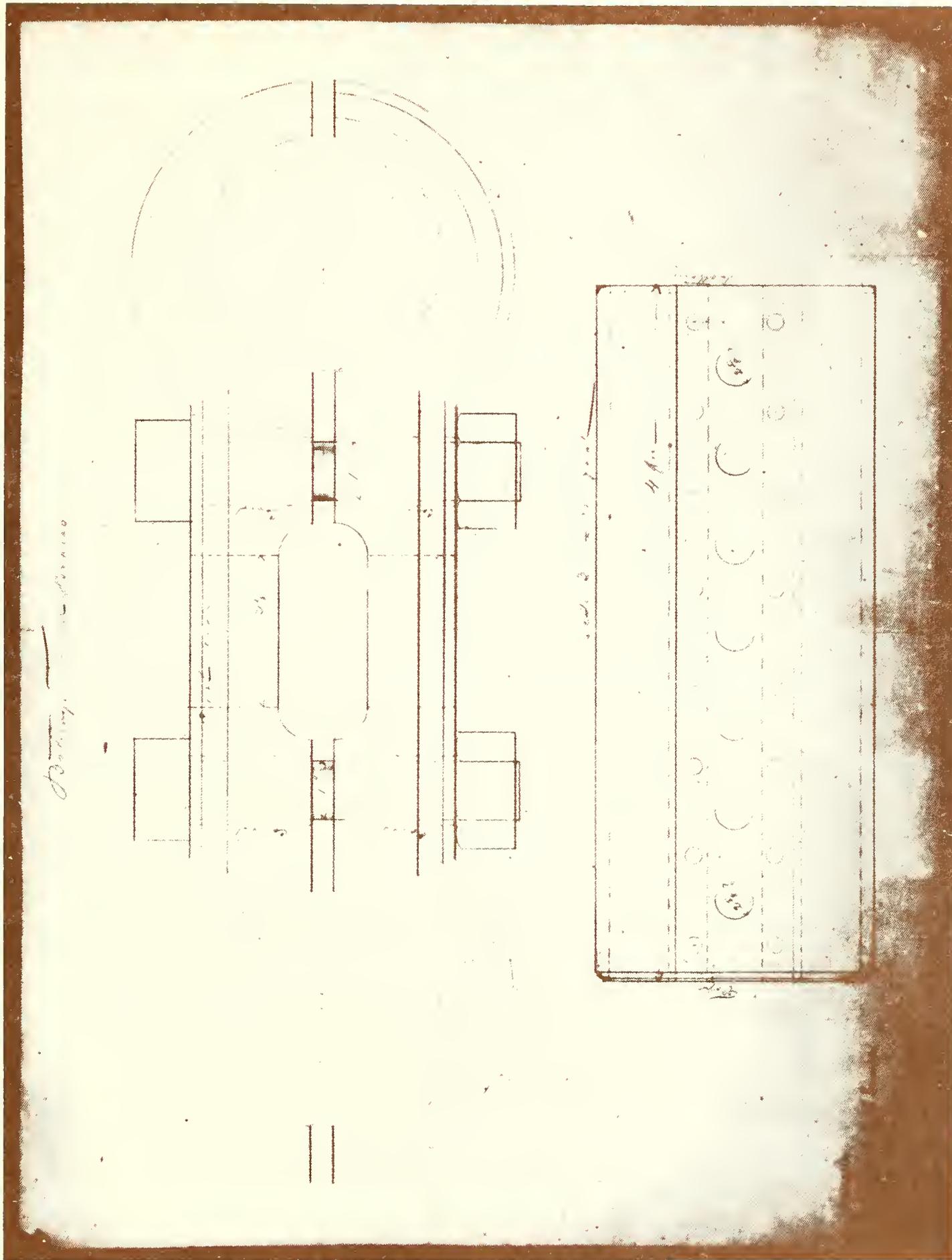
Condition: Excellent

Remarks:

The device shown in the drawing has dimensions that coincide with the diameter of and spacing between the two vertical, 4-inch-diameter stanchions that support the turret central roof beam. If this device were clamped between the stanchions, the rigidity of the

columns would be increased significantly. The turret engine control rods would pass down through the central cavity.

As this rather large object, 4 feet long, does not appear in the April 12, 1862, issue of *Harper's Weekly*, which shows detailed sketches of the interior of the turret, it is assumed that the device was not installed, if at all, until after that date. On the other hand, the drawing may be of the pre-launch period and the device never installed. Exploration of the wreck will be required for verification.



172. "BATTERY. TURRET BRACES" (Stevens Institute of Technology)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 173

Title: "ERICSSON BATTERY. TURRET SHAFT AND CLUTCH."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

26 1/4 inches by 15 1/4 inches (est.)

Size [Sight]:

25 inches by 15 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 " = one foot"

Notes: See "Remarks"

Signature/Initials: "Monitor/Capt. E." [Pencil]

" 'Monitor'/Turret Shaft and Clutch/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 69(124)

Condition: Good

Remarks:

This drawing shows an elevation looking fore and aft and four plan views of the 5-foot-10 3/4-inch-long turret shaft, clutch, clutch ring, and large spur wheel. "Open keyways" are indicated in the shaft to carry the reversing gear control rods from the turret chamber to the yoke below the large spur wheel.

A series of notes provide clues to the construction of the clutch:

"a. Cast iron clutch. Rough. to be put in hot."

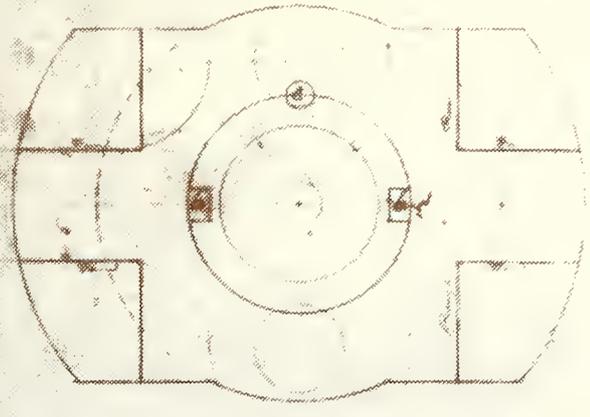
"b.b. Key ways to be left open."

- "c. Steel pin put in after shrinking on the clutch."
- "d.d. Keys for securing turret shaft on large spur wheel."
- "f.f. Wrought iron ring put in hot. Rough."

The turret shaft is hollow with a "Rough hole about 2 inches diameter" running through the center for its entire length.

The main turret beam is shown in the clutch, indicating that friction alone held the turret on the shaft. The vertical "posts" on the clutch face apply the torque to rotate the turret, while the width of the clutch on the hub of the shaft prevents tilting. With this manner of construction the turret should slide off the shaft and clutch when the ship is inverted, inasmuch as there appear to be no fasteners between the clutch and the main beam.

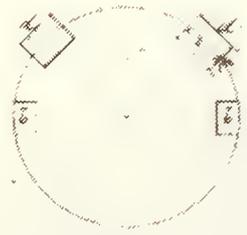
Ericsson's Patent for a Turret Shaft and Clutch
Serial No. 1000



*after the turret is put in
 66 the turret is open
 and the turret is turned
 and the turret is turned
 and the turret is turned*



the turret is turned



*Member of the
 Ericsson's Patent for a Turret Shaft and Clutch
 Capt. Ericsson*

173. "ERICSSON BATTERY. TURRET SHAFT AND CLUTCH"
 (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 174

Title: " 'BATTERY.' UPPER BEARING OF TURRET SHAFT."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Black and brown ink on paper.

Size [Sheet]:

18 3/8 inches by 24 1/4 inches (est.)

Size [Sight]:

19 1/8 inches by 17 3/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"Cast Iron"

"Bored" [Shaft hole]

"Oil Channel" [Four grooves on bottom of clutch bearing]

Signature/Initials: "Monitor/Made by CW," [Pencil]

" 'Monitor'/C. W. M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

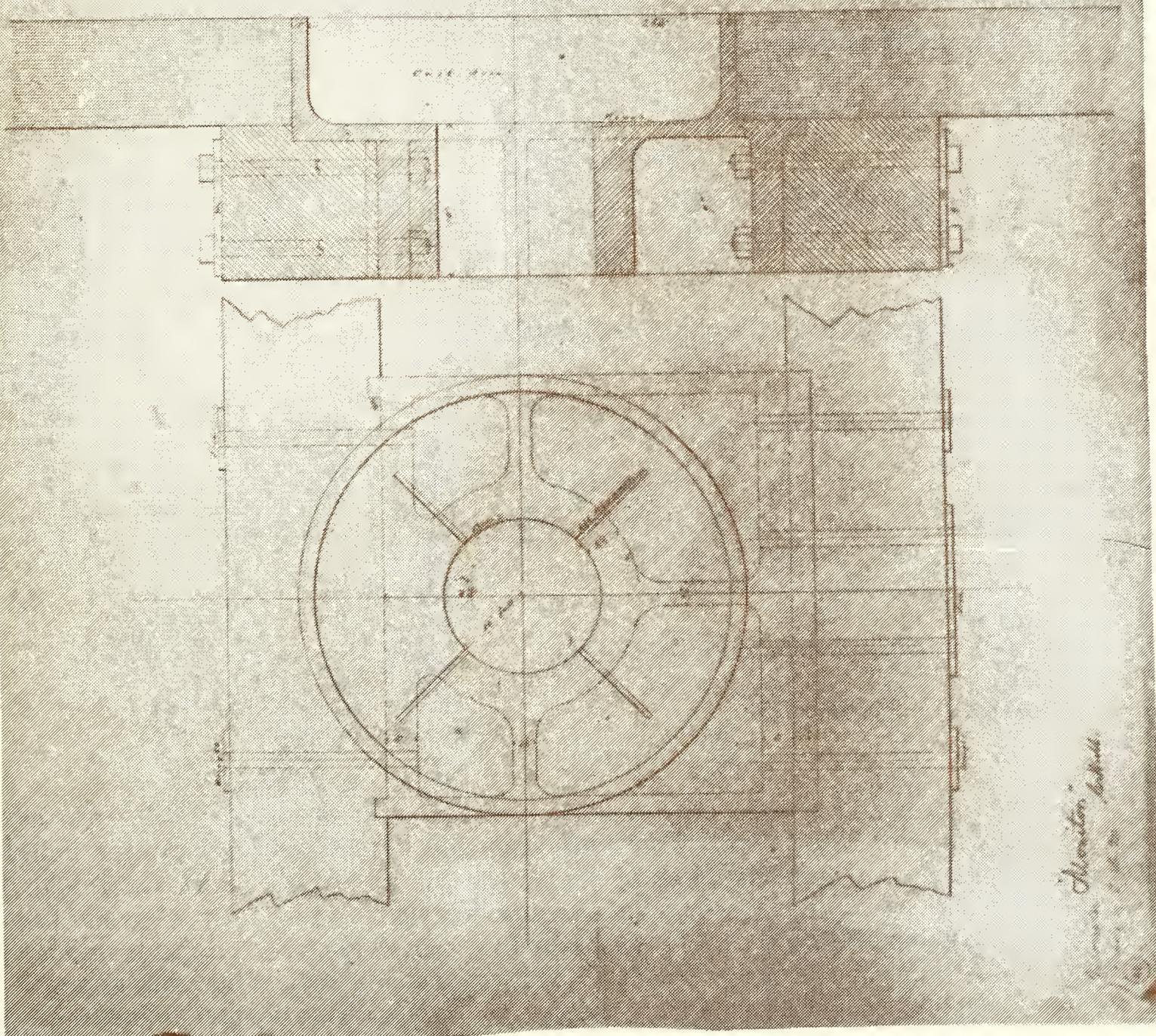
Identification: Drawing No. 42(103)

Condition: Excellent

Remarks:

This cast iron bearing is supported by two deck beams and keeps the turret shaft in place in the deck. The hollow, open construction on the bottom side of the bearing permits access to the beam bolt nuts.

Battery Upper Bearing of Turret Shaft
Scale 1/2 inch to 1 foot



174. " 'BATTERY.' UPPER BEARING OF TURRET SHAFT."
(Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 175

Title: " 'BATTERY.' BRACKET FOR TURRET SHAFT."

Date of Subject:
ca. October 1861 (est.)

Draftsman/Life Dates:
Charles William MacCord (1836-1915)

Medium: Black, blue, and red ink on paper.

Size [Sheet]:
18 1/4 inches by 25 1/2 inches (est.)

Size [Sight]:
15 1/8 inches by 24 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Notes:

"20,000 [lbs] pull wanted/3 ["square" symbol] in. x 600 = 18,000" [on wedge]
[A series of calculations in the upper right-hand corner result in the figure
"20,000"]

Signature/Initials: "Monitor/CWM" [Pencil]
" 'Monitor'/C. W. M.'" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

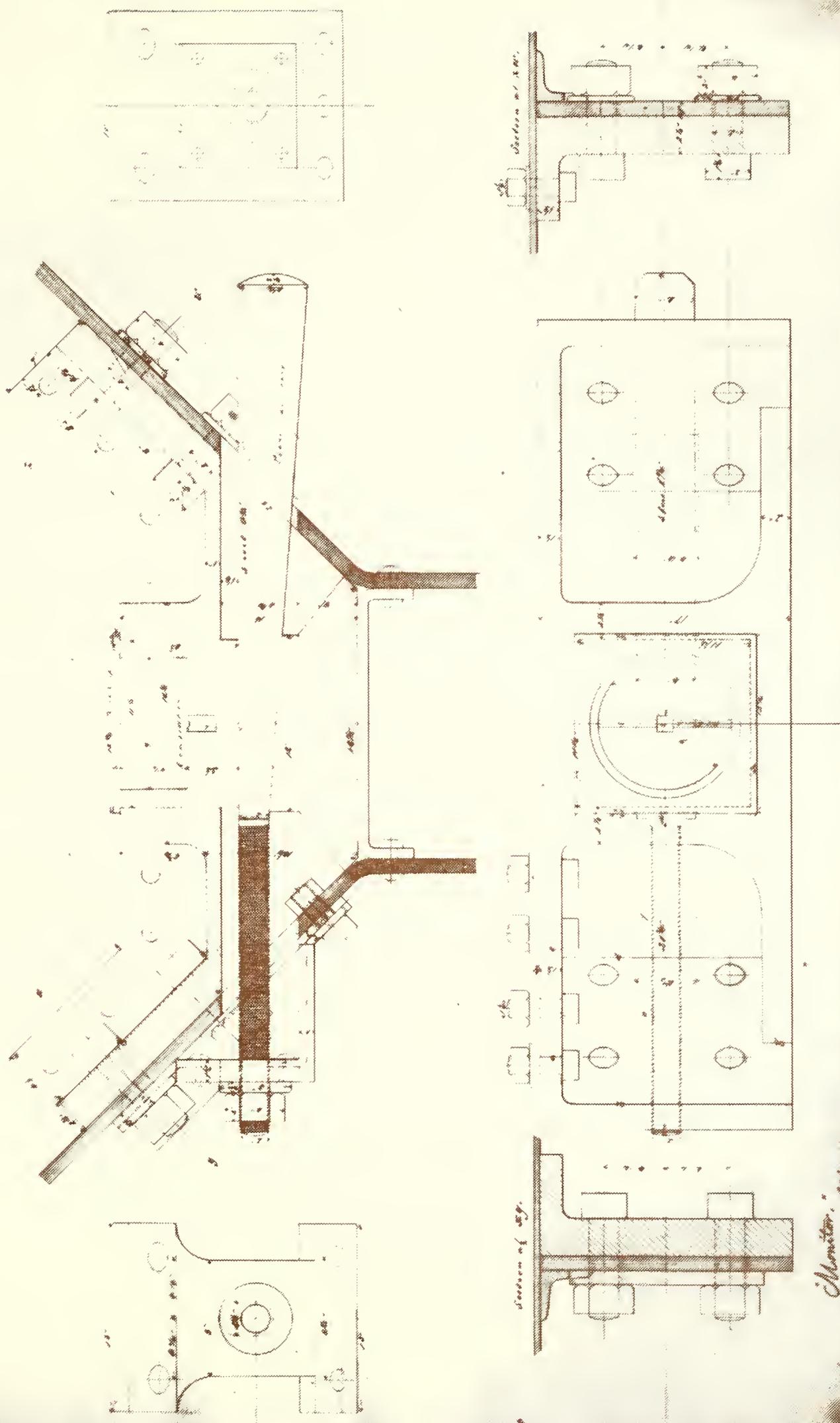
Identification: Drawing No. 43(103)

Condition: Excellent

Remarks:

This drawing shows a transverse section of an elevation and a top view of the bracket that supports the turret shaft. The right-hand and left-end views show the individual bracket pieces that take the force of the nut on the end of the wedge shaft key. Two auxiliary views show the cross section through the right and left "wings" of the bracket. The wedge-shaped key is sloped on the bottom side at about 4.3 degrees and is operated by a 2-inch-diameter screw with 3 3/4 threads to the inch. When fully engaged, the key is capable of lifting the turret shaft 2 3/4 inches. The bracket is mounted on a Y-shaped dual web that spans the large spur gear and is attached to the forward side of the main bulkhead.

Battery: Bracket for Turned Shaft
Scale: 3/8" = 1" Dia.



175. "BATTERY" BRACKET FOR TURRET SHAFT." (Stevens Institute of Technology)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 176

Title: Turret Drive, Gear Train and Frame

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

20 3/4 inches by 26 1/4 inches (est.)

Size [Sight]:

20 3/4 inches by 19 1/4 inches (est.)

Inscribed:

Scale: 1 inch = 1 foot (est.)

Notes: See Remarks

Signature/Initials: " 'Monitor'/Capt. Ericsson [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 30(124)

Condition: Good

Remarks:

This sketch shows the turret engines and valve chests [very faintly], the gear train frame, and the location of the boiler backs.

This drawing and Catalog Drawings 13, 43, and 163 provide a good deal of information on the turret drive.

The following data can be seen and deduced from this drawing:

Gear	Circular Pitch	Pitch	Teeth (Cogs)	Hub Width	Flange Depth	Face Width	Shaft Diameter
		Circle Diameter					
Drive Pinion	2.5	8"	10	6"	1/4	(?)	4"
Small Spur	2.5	6 ft.*	88	(?)	(?)	5"	5 1/2"
Large Spur Pinion	3.5	12 1/4"	11	6 1/2"	3/4	(?)	5 1/2"
Large Spur	3.5	6 1/2 ft.	70	12"	(?)	11"	10"

* Two notes on the Small Spur Gear appear to be:

"N. 129 key 29"

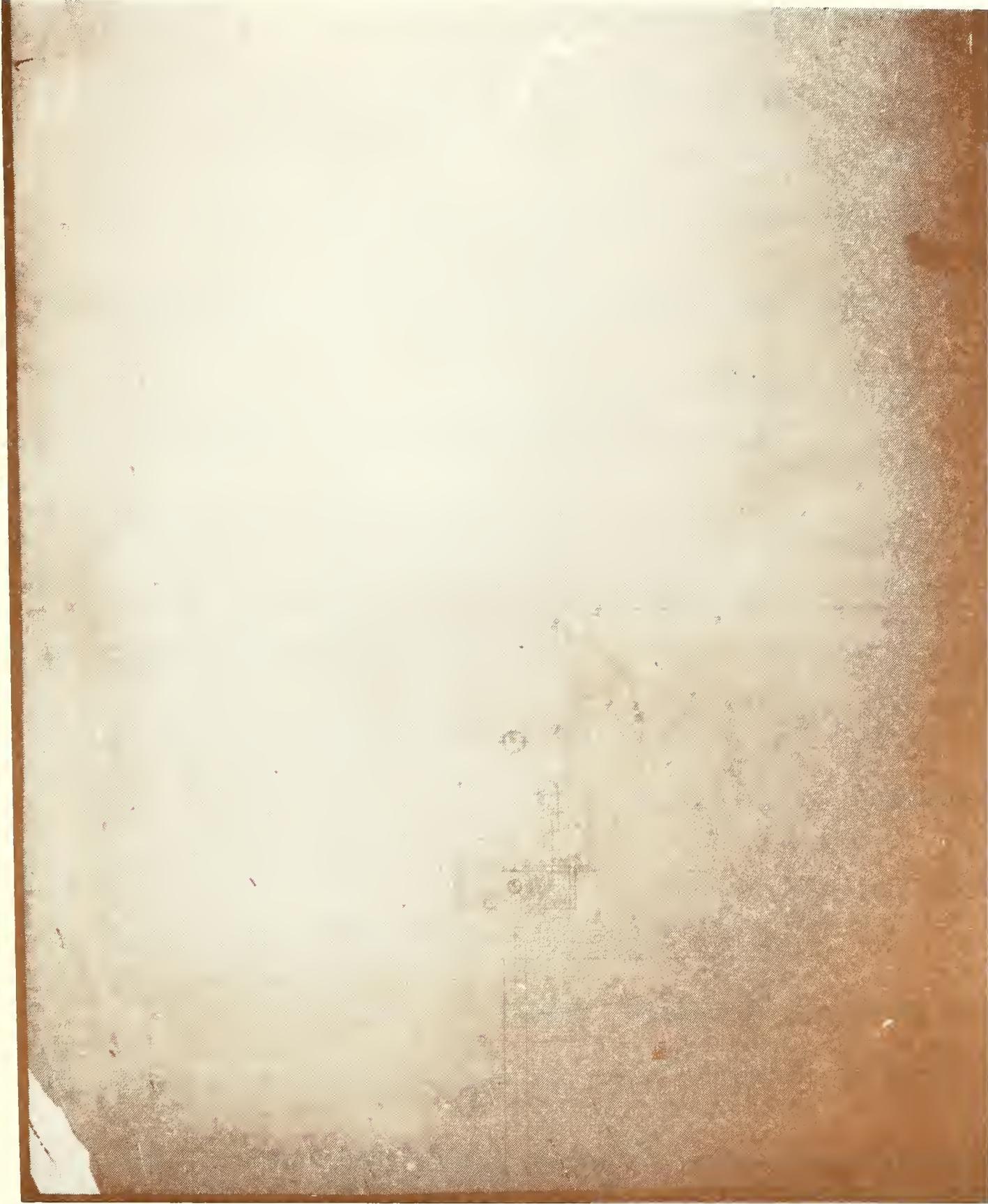
"2 1/2 pitch 88 cogs 5 [inch face], Dia. = 5:[feet]9 3/8[inches]"

The turret gear frame is an H-shaped structure bolted between a deck beam and the after side of the main bulkhead on the hull centerline. The after end of the frame supports the crankshaft bearing and the center the small-spur and large-spur pinion bearing. The forward end is bolted to the after side of the main bulkhead. The center, upper shaft bearing is clamped into the face of the deck beams at frame 21. The crankshaft is supported by a pillow block attached to the overhead deck beam at frame 22. The entire structure, the "Turret Frame," may be supported from below by two 2 3/4-inch-diameter stanchions.¹

The two turret engines are bolted to the underside of the deck beams and their axes lie at 45 degrees to both sides of the gear train center line. Their outlines are quite faint and show little detail.

Footnote:

¹ Cf. Catalog Drawing 177.



176. Turret Drive, Gear Train and Frame (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 177

Title: "BATTERY. STANCHIONS FOR TURRET FRAME"

Date of Subject:
ca. October 1861 (est.)

Draftsman/Life Dates:
John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:
21 1/8 inches by 14 1/2 inches (est.)

Size [Sight]:
17 1/4 inches by 10 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: 3 inches = 1 foot (est.)

Notes:

"Two of this- Difference of length 1/2 inch"
"wrought iron-Polished" [Stanchion]
"Cast iron- polished" [Deck flange]
"Floor plate"

Signature/Initials: "Monitor/Capt. E" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 36(91)

Condition: Excellent

Remarks:

This drawing shows the dimensions for two 2 3/4-inch-diameter stanchions 7 feet 1/4 inches and 7 feet 3/4 inches in height. The end connections of these stanchions are different from the deck beam and turret stanchions. They are identified as being used with the "turret frame." Assuming that this refers to the turret gear train frame, it is surmised that these stanchions are used to support this frame at the center and at its after end to prevent sagging in the gear structure; this is another hypothesis that might be verified by investigating the wreck.



177. "BATTERY. STANCHIONS FOR TURRET FRAME" (Stevens Institute of Technology)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 178

Title: "TURRET GEAR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

23 inches by 38 1/2 inches (est.)

Size [Sight]:

21 1/2 inches by 35 3/4 inches (est.)

Inscribed:

Title Block / Caption: "Turret Gear - Wrought Iron, polished"

Scale: Full (est.)

Notes:

"Draw File/9 feet 4 inches." [Rod from control handle to turret shaft]

"5 feet 7 inches." [Turret shaft control rod to shaft yoke]

Signature/Initials: "Monitor/Capt. E." [Pencil]

" 'Monitor'/Turret Gear Details/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

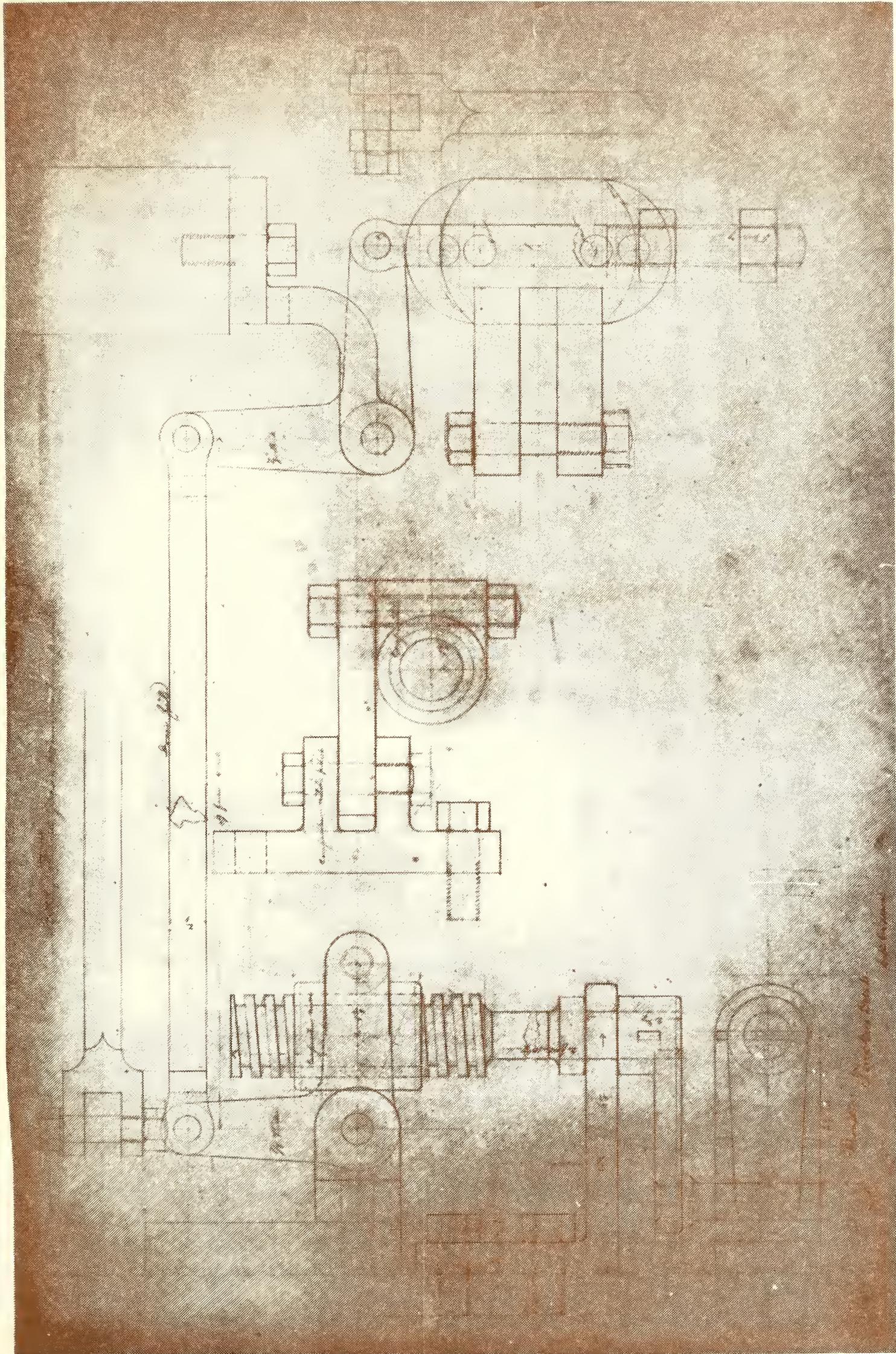
Identification: Drawing No. 51(134)

Condition: Excellent

Remarks:

This drawing describes the mechanism in the turret that controls the starting, stopping, and reversal of the turret motion. The arrangement consists of a crank handle mounted in a bracket fastened to the turret bulkhead abreast of the gun trunnions when the gun is in battery — apparently on the right side of the turret. Rotating the hand crank in a horizontal plane turns the vertical screw shaft of two threads per inch. This rod moves a pivoted bushing attached to a right angle crank rotating about a bulkhead bracket. The crank drives a horizontal rod that extends across the turret to the turret shaft and

terminates on a right-angle crank. This latter crank is pivoted on a bracket suspended from the center roof beam between the turret stanchions. A 5-foot-7-inch rod is suspended from the other end of this rod and is attached to the center of a spreader bar, which supports the two rods that run down the open keyways of the turret shaft and transmit the control handle motion to the below-decks yoke on the shaft.



178. "TURRET GEAR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 179

Title: "TURRET GEAR"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

20 inches by 32 inches (est.)

Size [Sight]:

18 7/8 inches by 30 1/4 inches (est.)

Inscribed:

Scale: Full (est.)

Notes: "8 inch full/to fit Turret Shaft full" [Slide internal diameter]

Signature/Initials: "Monitor/Made by Capt. Ericsson" [Pencil]
" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

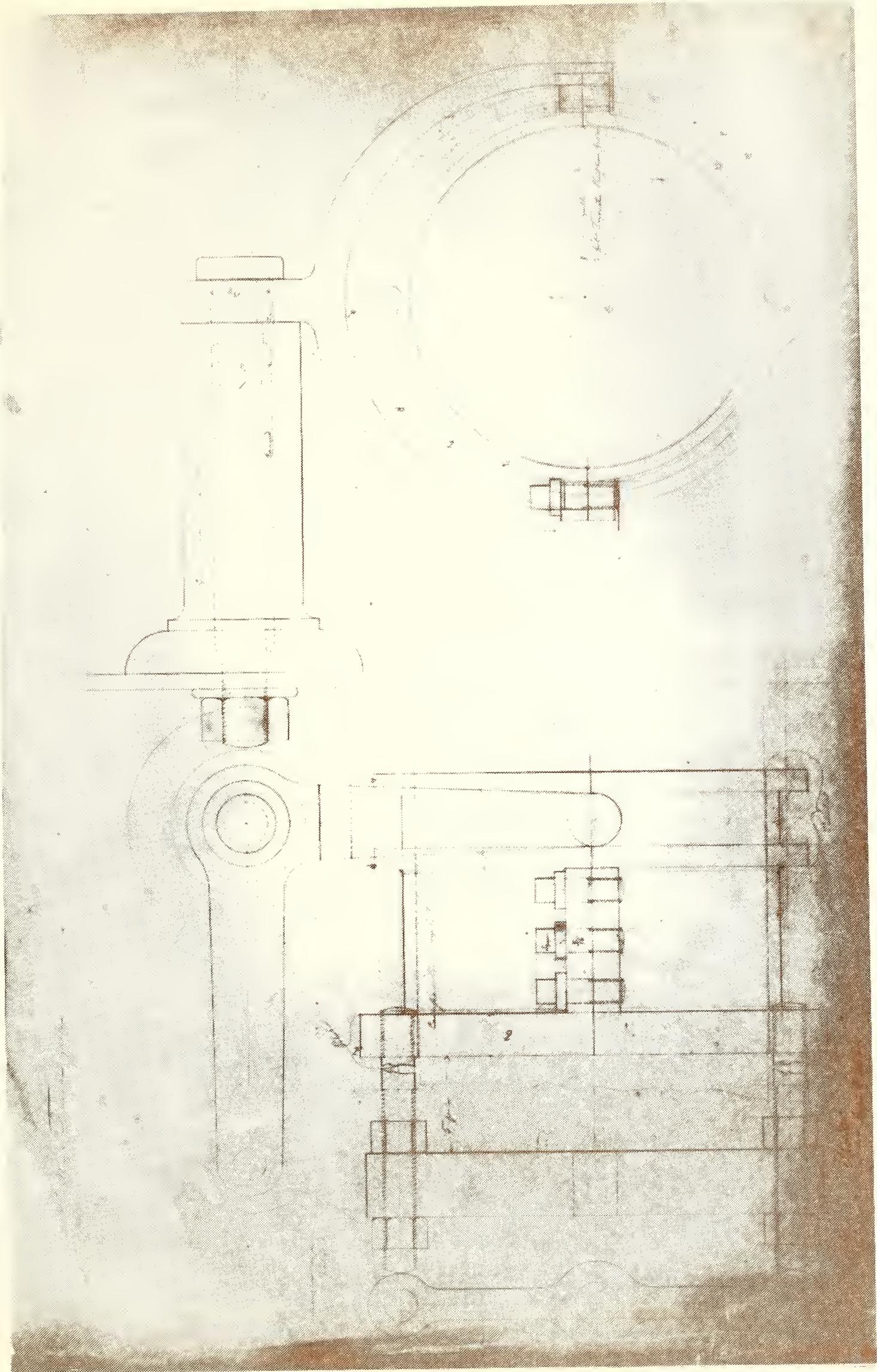
Identification: Drawing No. 18(132)

Condition: Good

Remarks:

This drawing shows the mechanism at the bottom of the turret shaft for continuing the motion of the control crank from the turret to the turret engines. The device displays at the top of the turret shaft the spreader bar that operates the parallel rods running down the shaft in the open keyways. The rods are fastened to the upper end of a split sleeve under the large spur gear.

A circular track at the lower end of the sleeve guides the motion of the two pins attached to a yoke, raising and lowering the open end with the vertical motion of the slide. The yoke is pivoted on a post that is connected to the main bulkhead. A right-angled arm on the yoke transmits the motion to a horizontal rod running parallel with the main bulkhead to another crank, axle, crank arrangement, and horizontal rod running aft over the larger spur gear to the turret engine valves — as seen in Catalog Drawing 43.



179. "TURRET GEAR" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 180

Title: "TURRET GEAR - THREE"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

9 1/4 inches by 11 1/2 inches (est.)

Size [Sight]:

8 7/8 inches by 8 1/2 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes: "Brass/Milled" [Edge of thumb screws]

Rendered: ca. October 1861 (est.)

Original:

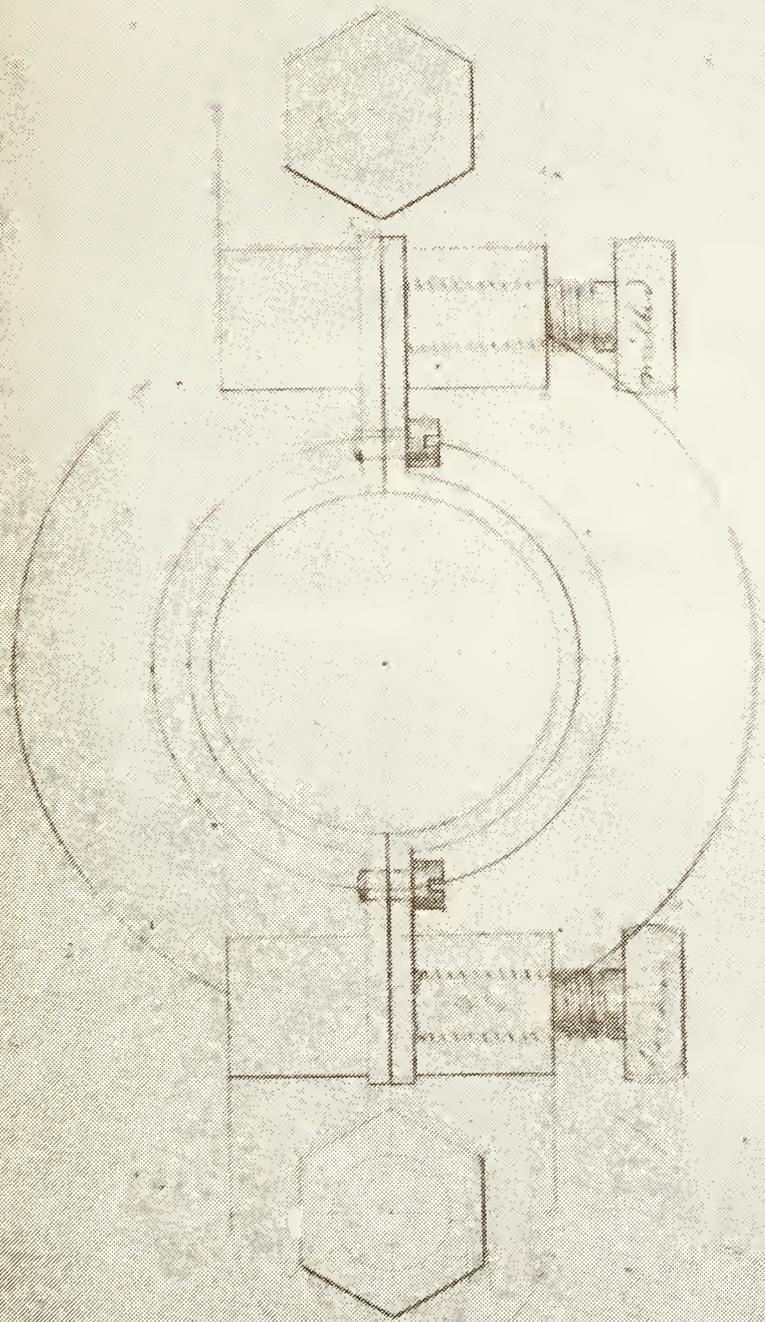
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 53(124)

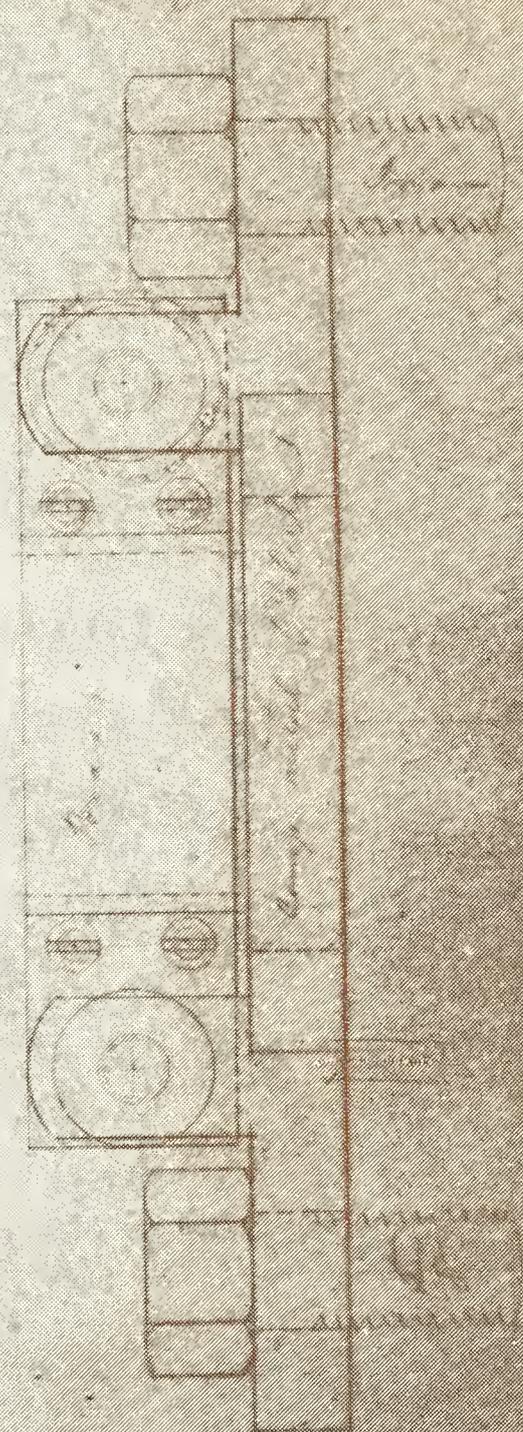
Condition: Excellent

Remarks:

The device shown is a split brass hanger with a wall thickness of 1/8-inch and an internal diameter of 1 13/16 inches. The two halves are held together by four 3/16-inch-diameter brass thumb screws with milled edges. The 2 1/2-inch-diameter holes under the bushing allow about 3/16 inches motion in the bracket posts. The bracket is mounted with two 5/8-inch bolts that extend one inch below the mounting surface. No rod or cylinder in the turret gear of 1 13/16 inches has been identified, nor has the function of these three hangers been determined.



Turret gear - Three



180. "TURRET GEAR - THREE" (Stevens Institute of Technology)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 181

Title: "BORING MACHINE FOR TURRET"

Date of Subject:

ca. November 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

17 3/4 inches by 27 inches (est.)

Size [Sight]:

17 1/8 inches by 27 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "1 1/2 inches = one foot"

Notes:

"Not part of Monitor" [Pencil]

"Engine shaft"

"a a Braces running to top of Turret"

Signature/Initials: "Capt. E." [Pencil]

Rendered: ca. November-December 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 79(126)

Condition: Excellent

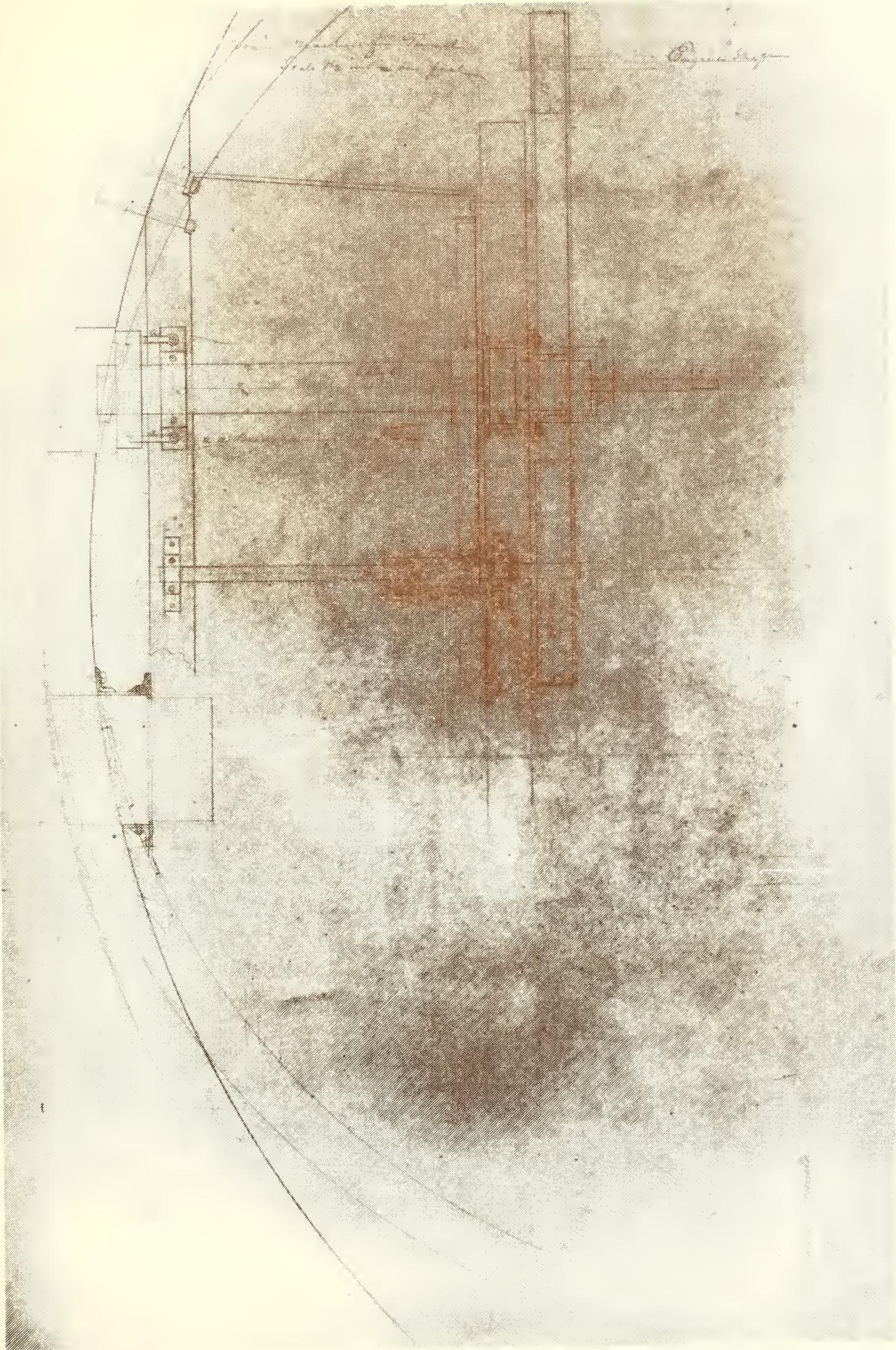
Remarks:

This drawing shows a steam-driven machine for boring the gunports¹ in the bulkhead of a *Monitor*-type turret. The penciled comment that this machine is "not part of the Monitor" is correct; however, the arcs of the turret bulkhead in one case corresponds to the 20-foot internal diameter of the *Monitor*, and this machine is probably the one used to cut the *Monitor*'s gunports. The machine is composed of 8-inch-by-[8-inch?] strongbacks bolted to the turret bulkhead behind the gunport location. A rotary cutter the diameter of the ports is attached to the forward end of an 8-inch-diameter by 6-foot-6-inch shaft

mounted in hangers on the strongback and a parallel beam at the after end of the shaft. The shaft is rotated by a 4-foot-6-inch-diameter spur gear driven by a 6-inch-diameter pinion mounted on an auxiliary shaft on the turret centerline. The pinion shaft is rotated by a 3-foot-diameter pulley from a belt driven by a 16-inch-diameter pulley mounted on an engine shaft. The pinion gear is 15 inches long and allows the spur gear to remain engaged as it is driven forward by a screw on the after end of the shaft. The screw runs through a frame mounted on the after beam and advances the saw automatically as the machine rotates. The forward and after beam are braced to the turret bulkhead by diagonal struts.

Footnote:

- ¹ Cf. Gordon P. Watts, Jr., *Monitor of a New Iron Age*, unpublished master's thesis, East Carolina University, 1975.



181. "BORING MACHINE FOR TURRET" (Stevens Institute of Technology)



U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 182

Title: "BATTERY. SHIELD FOR TURRET"

Date of Subject:

ca. March 1862 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Ink on paper.

Size [Sheet]:

15 inches by 22 1/4 inches (est.)

Size [Sight]:

14 inches by 17 5/8 inches (est.)

Inscribed:

Title Block/Caption: The title has been taken from the Stevens Institute of Technology index of the MacCord Collection.

Scale: 1 1/2 inches = 1 foot (est.)

Signature/Initials: " 'Monitor'/C. W. M." [Ink]

Rendered: ca. March 1862 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 10(103)

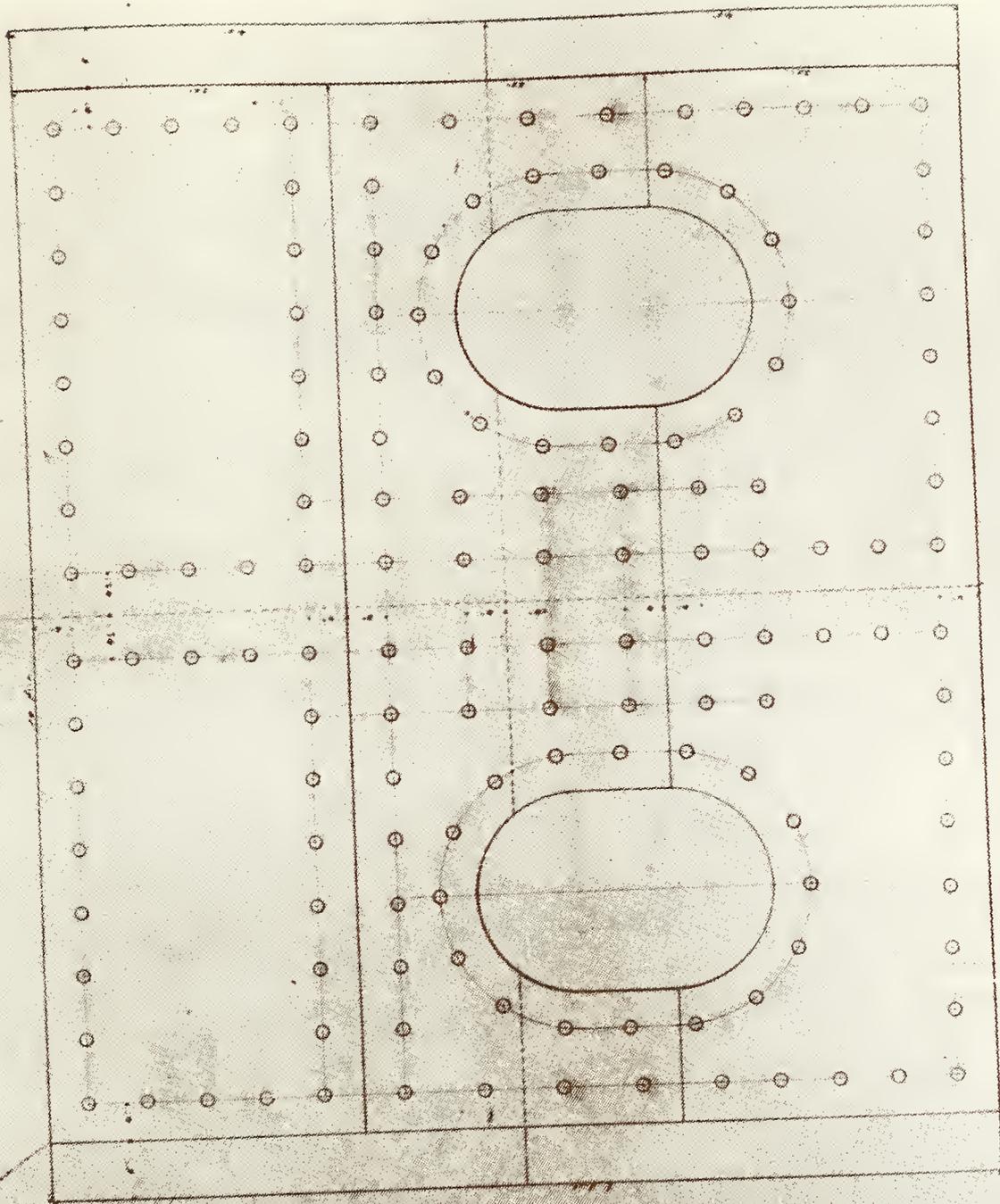
Condition: Excellent

Remarks:

These two courses of plates consist of three 32-inches-by-9-foot plates on the front course measuring 8-feet-by-9-feet and four plates on the rear course measuring 4-feet-by-5-feet each and 8-feet-by-10-feet overall. The plates are riveted together and have been bored out to match the spacing and size of the *Monitor's* gunports: 5 feet between centers with ports 30 inches by 20 inches.

The dimensions of the plating coincide very nearly with the sketches of the "smoke box" indicated in Catalog Drawing 164. The smoke box measures 11 feet overall width, and the front plate is 8 feet 10 1/2 inches. The 8-foot height of the plate would be one foot short of the turret height, thereby providing a 10 1/2-inch clearance between the bottom of the smoke box and the deck.

If this shield were intended for the *Monitor*, it may have been conceived after the engagement with the *Virginia*. As it never appears in any photograph or artist's conception of the *Monitor* and does not appear to be present in the wreck, it is assumed that this was a concept applied to some of the later monitors.



Chambers & Co. N.Y.

(10)

182. "BATTERY. SHIELD FOR TURRET" (Stevens Institute of Technology)

ORDNANCE
Numbers 183-205

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 183

Title: "DRAFT OF ELEVEN-INCH SHELL GUN"

Date of Subject:
March, 1851

Draftsman/Life Dates:
Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:
18 3/8 inches by 30 1/2 inches

Size [Sight]:
17 inches by 28 1/4 inches

Inscribed:

Title Block / Caption: "Draft of Eleven-inch Shell Gun"
"prepared, Designed and computed by"
"John A. Dahlgren"

Scale: "1/8 Size," [Gun tube]
"1/2 Size." [Curvature of gun at trunnions]

Notes:

Top Left: "Office Copy"

Upper Left: "Note to Sketch of curvature
[Black ink]

In this sketch the figures in Black correspond with those of the draft on 1/8" scale and denote the diameters to be given the piece.

Those in Blue as well as the lines in Blue denote right lines on which the curves are projected and are only given to show how far the curved line differs from the right line, so as to serve as a guide to the workmen in forming the piece."

Middle Left: "—Duplicate specimens from head to be transmitted to Washington.
[Black ink] —Patterns will be provided for the lock lugs.
—The masses for the sight colored blue are to be left large enough to clean down to sizes given."

Lower Left: "The rough castings is not to be less than the red line from the cylinder to
[Red ink] the muzzle and to be larger than the proper dimensions."
[Black ink] "—The right vent only should be bored."

[Black ink] "Note
In copies for the Foundry the lines designating holes for Elevation Screw should be left out."

Bottom Left: "Ad. Class del^t, Nov. 25, 1854"
[Black ink] "Copy sent to Bureau June 1st 1861."
"Note. For this original draft a new one is substituted, dated Aug. 1862."

Bottom Right: "April 14, 1857[?]- Preponderance at 37.45 gives Propond, as low as
[Pencil] 7.75 ^{lb}(W.P.T.) 37.6 may be tried. J.A.D."

Left of trunnion on side view of tube:
[Pencil]

“37.34 - Vol. 3: - p. 261.”

At the title block:
[Black ink]

“Superseded
See Rev. 29590”

On the ends of the back of the sheet:
[Black ink]

“XI in. Shell Gun”

Rendered: March, 1851

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A,
Ordnance Plans, Drawing No. 3160.

Condition: Poor. Edges foxed. Tracing cloth has lost sizing. Edges torn and repaired
with cellophane tape.

Remarks:

Lieutenant John A. Dahlgren, Assistant Inspector of Ordnance, U.S. Navy submitted the design of his experimental, 11-inch shell gun on March 18, 1851 to Commodore Warrington, Chief of the Bureau of Ordnance and Hydrography and received approval on March 24, 1851.¹ The gun was developed to fire shell accurately at long range, as well as solid shot when required. Their early service was seen on the U.S.S. *Niagara* of the Merimack class of 1854, as a pivot on the gunnery practice ship, U.S.S. *Plymouth*, and as a broadside battery in the U.S.S. *New Ironsides*. This model was substituted for Ericsson's proposed 12-inch gun for the U.S.S. *Monitor*. The iron gun tube weighed about 15,700 pounds with an overall length of 159.7 inches, a breech diameter of 32 inches and a bore length, less chamber, of 131.2 inches. The distance across the trunnions was 50 inches. Following the death in 1856 of Commodore Charles Morris, successor to Commodore Warrington, Dahlgren was able to restore the provision for two vents to his shell gun.²

Footnotes:

¹ E.C. Canfield, *Civil War Ordnance*, Washington: Government Printing Office, 1969, p. 4.

² Drawing No. 3168, “Draught of Experimental Eleven Inch Shell Gun,” Ordnance Plans, Entry 202A, Records of the Bureau of Ordnance, Record Group 74, National Archives.



183. "DRAFT OF ELEVEN-INCH SHELL GUN" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 184

Title: XI-Inch Gun To Be Furnished *Monitor*

Date of Subject:

October 15, 1861

Draftsman/Life Dates:

Alban C. Stimers (1827-1876)

Medium: Ink on tracing cloth.

Size [Sheet]:

12 3/4 inches by 19 5/8 inches (est.)

Size [Sight]:

11 inches by 18 inches (est.)

Inscribed:

Scale: 1 1/2 inches = 1 foot (est.)

Rendered: October 15, 1861

Original:

Location: National Archives

Identification:

Record Group 71, Bureau of Yards and Docks, E5, Letters Received, Miscellaneous Stimers to Welles, November 15, 1861.

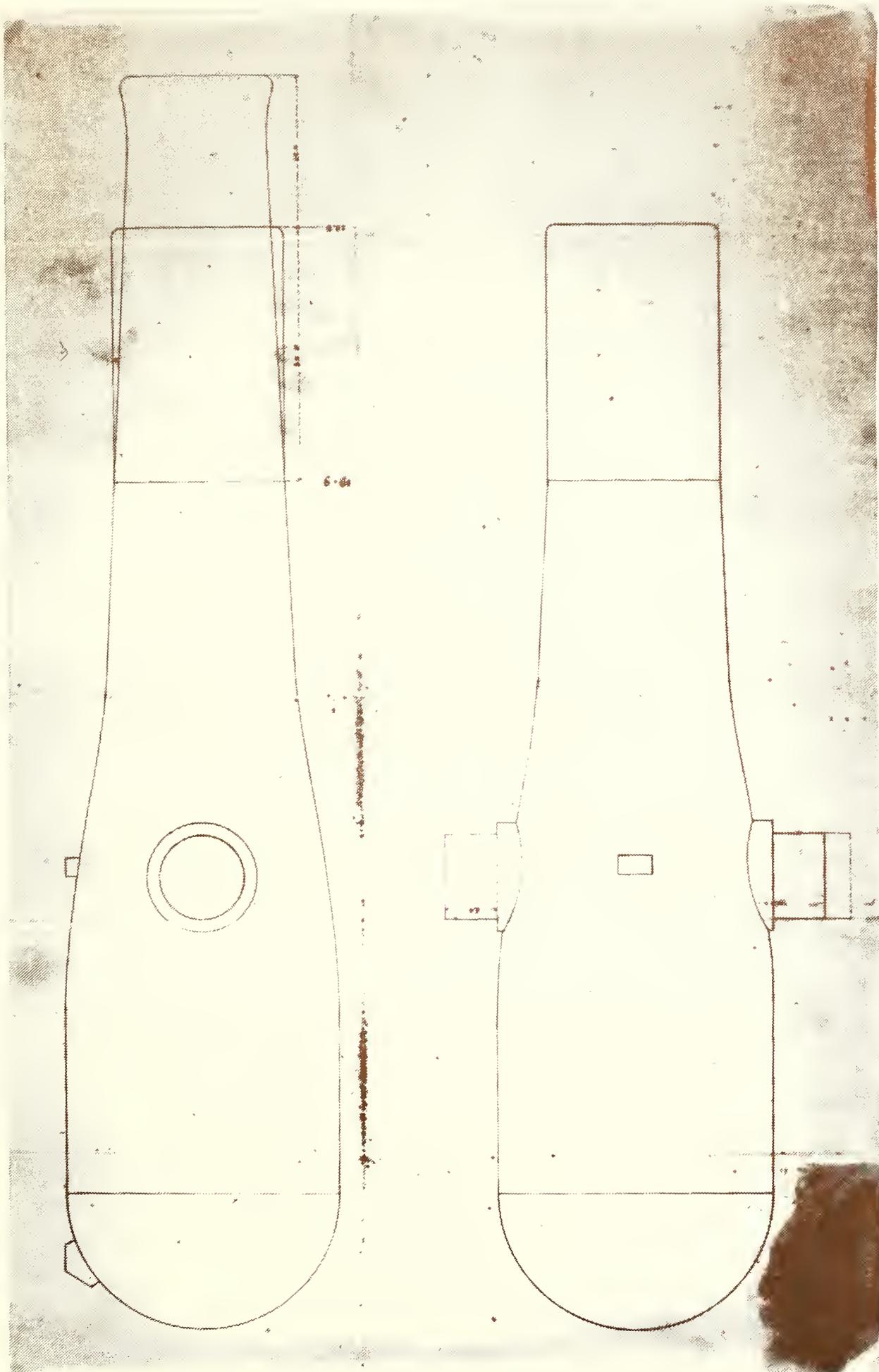
Remarks:

This drawing is the enclosure to the November 15, 1861 letter of Chief Engineer and Superintendent Alban C. Stimers, USN, to the Secretary of the Navy, Gideon Welles¹, recommending a shortened barrel to facilitate the loading of the 11-inch guns to be installed on the *Monitor*. Stimer's recommendation was not accepted and the Navy provided two standard 11-inch guns from the U.S.S. *Dacotah*².

Footnotes:

¹ Stimers to Welles, November 15, 1861, RG 71, Bureau of Yards and Docks, E5, Letters received, Miscellaneous.

² Gordon P. Watts, Jr., *Monitor of a New Iron Age*, unpublished master's thesis, East Carolina University, 1975, p. 101.



184. XI-Inch Gun To Be Furnished Monitor (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 185

Title: "DAHLGREN SHELL GUN"

Date of Subject:

1854

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

5 1/2 inches by 9 inches

Size [Sight]:

1 7/8 inches by 6 1/2 inches

Inscribed:

Title Block/Caption: See title.

Signature/Initials: "D. Van Nostrand Publisher; Julius Bien, pr"

Rendered: ca. 1866

Publication:

U.S. Navy Department, *Ordnance Instructions for the United States Navy*, Washington: Government Printing Office, 1866, p. 8, part III.

Remarks:

Commander John A. Dahlgren's design for shell guns is shown in this diagram. The dimensions are coded, as there existed a personal attitude of secrecy among various individuals of the Navy Department about publishing such information. The following tables show the dimensions for this tube:

11-INCH DAHLGREN SHELL GUN

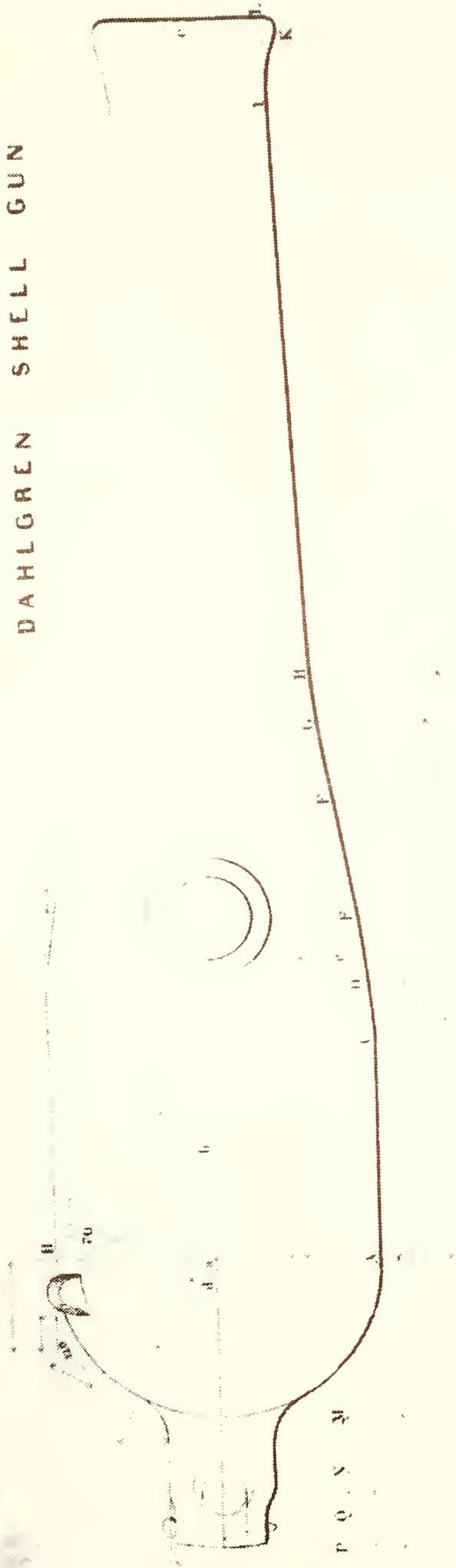
Drawing Symbol	<u>The Tube</u>		Location	<u>Sight Masses</u>	
	Dimensions (inches)			Dimensions (inches)	
	Distance from A	Diameter		Rear	Front
A	—	32.0	Horizontal Length	3.2	2.25
B	—	32.0			
C	23.3	32.0	Diagonal Length	3.5	
D	28.8	31.3			
E	37.2 ¹	29.2	Distance from A	9.25	37.4
F	48.3	25.6			
G	56.9	22.8	Width	2.25	2.25
H	61.2	22.1			
I	122.2	16.26 ²			
K	129.7	17.7			
L	131.2	15.4			
M	16.0	4.35 (rad.)			
N	21.5	9.5			
P	28.5	9.0			
Q	25.5	9.0			
a	—	3.52 (rad.)			
b	11.0	11.0			
c	131.2	11.0			
d	—	5.5			
e	32.2	30.5			

The 11-inch shell weighed 136 pounds and could be fired 1,172 yards at 5 degrees elevation with a 15-pound charge. Forty-one cast iron shot weighing 170 pounds were fired during the engagement with the C.S.S. *Virginia*, breaking several of the top layers of the *Virginia's* armor. The guns, Nos. 27 and 28³, had been manufactured in 1859 at Robert P. Parrott's West Point Foundry in Cold Springs, New York. After the battle with the C.S.S. *Virginia* one was engraved "Monitor & Merrimac Worden" and the other "Monitor & Merrimac-Ericsson⁴."

Footnotes:

- ¹ Drawing No. 3160, "Draft of Eleven-Inch Shell Gun," Ordnance Plans, Entry 202A, Records of the Bureau of Ordnance, Record Group 74, National Archives.
- ² Drawing No. 3169, "XI-inch Shell Gun," Ordnance Plans, Entry 202A, Records of the Bureau of Ordnance, Record Group 74, National Archives.
- ³ E.C. Canfield, *Civil War Ordnance*, Washington: Government Printing Office, 1969, pp. 4, 10, 16, 20.
- ⁴ William F. Keeler, *Aboard the U.S.S. Monitor, 1862*, edited by Robert W. Daly Naval Letter Series, No. 1 Annapolis: United States Naval Institute, 1964, p. 232.

DAHLGREN SHELL GUN



185. "DAHLGREN SHELL GUN" (Government Printing Office)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 186

Title: "GUN CARRIAGE OF THE MONITOR"

Date of Subject:

October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Black, blue, red and brown ink and pencil on tracing cloth.

Size [Sheet]:

8 inches by 11 5/8 inches

Size [Sight]:

5 1/4 inches by 9 1/4 inches

Inscribed:

Scale: "1 inch = one foot."

Rendered: October 1861 (est.)

Original:

Location: National Archives
Washington, D.C.

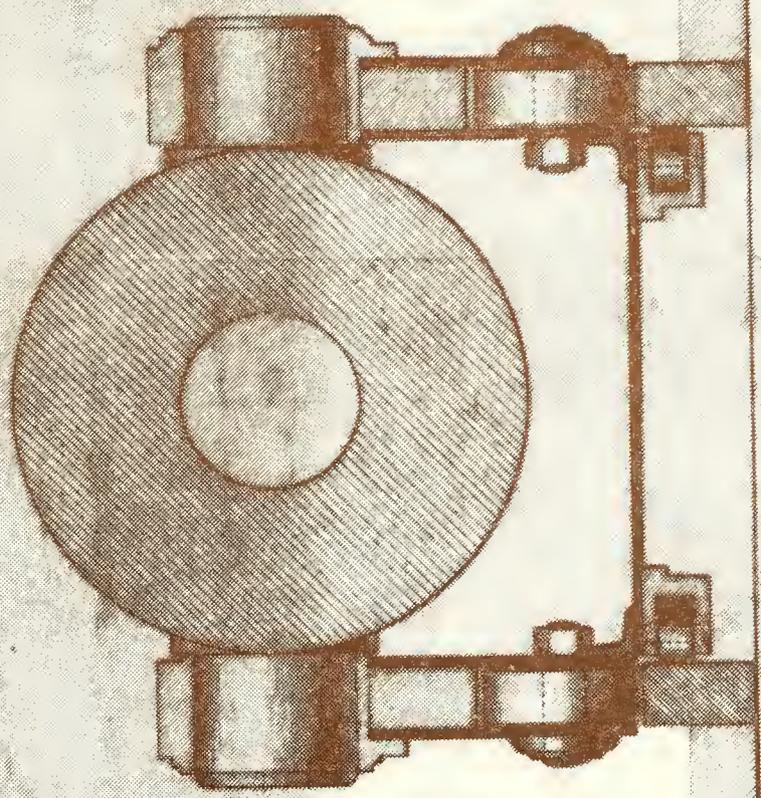
Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A,
Ordnance Plans, Drawing No. 2604.

Condition: Excellent

Remarks:

This drawing shows a transverse section through the gun and carriage at the trunnions. It is probably a preliminary layout to show the action of the "rollers", or "trucks," of the brackets carrying the weight of the gun and carriage on the top of the rails and the function of "guide rollers" on the inner side of the rails to keep the carriage on the tracks. This section also shows the shapes of the trunnion cap squares and lower plates.

The draftsmanship and the handwriting of the title have the characteristics of John Ericsson.



A 13

Drawing No. 2604
 Location PTC K-6
 Order _____
 Board No. _____

Diff 3

Gun Carriage of the Monitor

Scale 1 inch = 1 foot

186. "GUN CARRIAGE OF THE MONITOR" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 187

Title: Gun Carriage

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

16 inches by 20 inches (est.)

Size [Sight]:

11 1/2 inches by 20 inches (est.)

Inscribed:

Title Block/Caption: Title taken from the Stevens Institute of Technology index for the MacCord Collection.

Scale: 1 1/2 inch = 1 foot (est.)

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 63(96)

Condition: Good

Remarks:

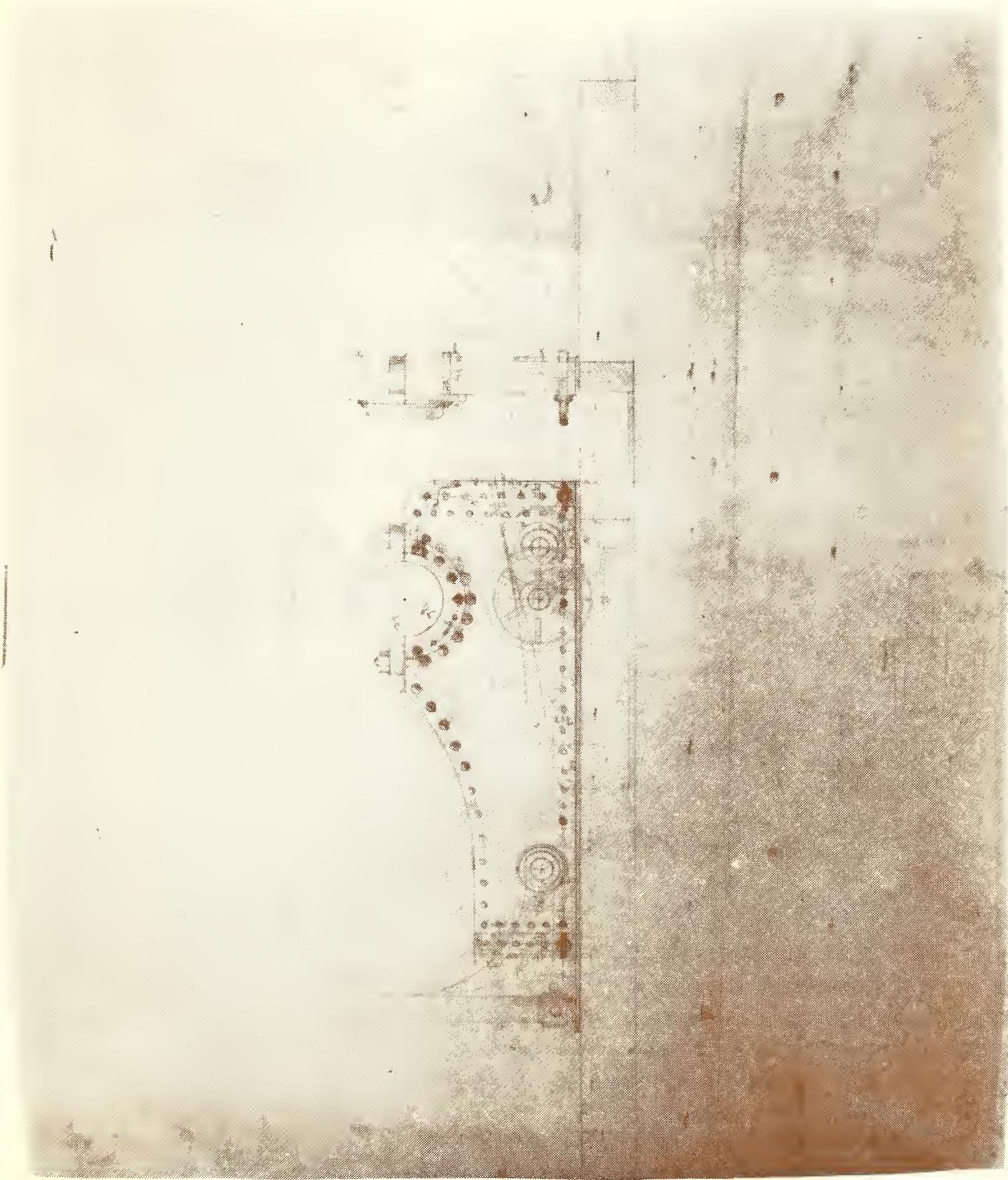
This drawing shows the side and end view of the 11-inch gun and carriage for the *Monitor*. The gun is sketched in at the horizontal position and also at 8 degrees elevation. The motion of the elevating screw is shown in the corresponding positions. The carriage indicates the angle-iron frame with its four internal rollers that support the weight of the gun carriage. The check wheel for the compressor of the friction gear is located below the trunnion. Eyebolts for tackles are mounted at the forward and after end of the outer side of the carriage. Corresponding eyes at the outer ends of the forward and after spreader plates for the gun pads and friction plates¹ indicate that the *Monitor's* gun carriage was run in and out of battery by block and tackle rather than by a hand crank and gear train adapted for the 15-inch carriage in later monitors². A crude sketch indicates that some sort of sight mechanism may be attached to the breech of the gun.

The gun carriage rides on two rails and, except for the friction gear, has no rigid attachment to the turret. There is a good possibility that the guns and carriages of the *Monitor* would have dropped off their tracks when the turret turned over during the sinking and are wedged in the diagonal braces.

Footnotes:

¹ Cf Cata. Nos. 196, 197, 198, 203 and 204.

² U.S. Navy Department, *Ordnance Instructions for the United States Navy*, Washington: Government Printing Office, 1866, p. 109.



187. Gun Carriage (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 188

Title: " 'BATTERY.' TEMPLATE FOR GUN CARRIAGES"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

9 3/4 inches by 20 inches (est.)

Size [Sight]:

6 1/4 inches by 16 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "3 ins. = 1 Foot"

Signature/Initials: "Monitor" [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 27(96)

Condition: Excellent

Remarks:

This drawing shows the outline and layout of rivet and screw holes for the frames of the 11-inch gun carriage.



188. " 'BATTERY.' TEMPLATE FOR GUN CARRIAGES" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 189

Title: "ERICSSON BATTERY: FRAMES, GUN CARRIAGE"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, and red ink on tracing cloth.

Size [Sheet]:

8 1/4 inches by 34 3/4 inches

Size [Sight]:

6 inches by 33 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3 inches = 1 foot"

Rendered: ca. October 1861 (est.)

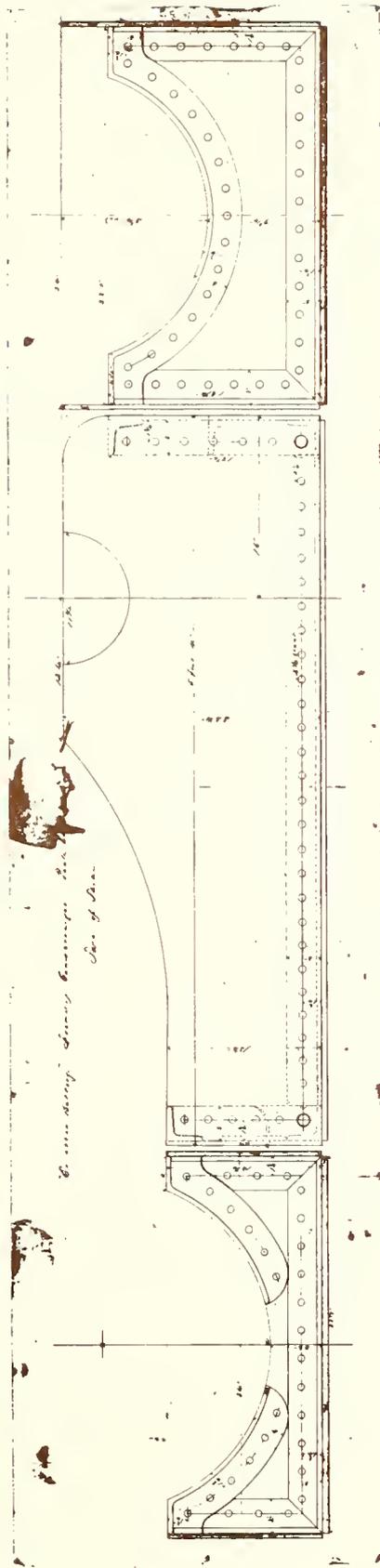
Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Stains and hand prints.

Remarks:

This drawing shows the side and end views of the layout of screw and rivet holes and angle iron for the frame of the 11-inch gun carriage.



189. "ERICSSON BATTERY: FRAMES, GUN CARRIAGE" (Thomas F. Rowland, Jr. Collection)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 190

Title: "ERICSSON BATTERY: FRAMES, GUN CARRIAGE"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:

8 3/8 inches by 34 3/4 inches

Size [Sight]:

5 7/8 inches by 33 1/2 inches

Inscribed:

Title Block/Caption: See title.

Scale: "3 inches = 1 foot"

Rendered: ca. October 1861 (est.)

Original:

Location: Thomas F. Rowland, Jr. Collection

Condition: Good

Remarks:

This drawing is probably a Continental Iron Works tracing of Catalog Drawing 189.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 191

Title: “ ‘BATTERY.’ ROLLERS FOR GUN CARRIAGES”

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on paper.

Size [Sheet]:

20 inches by 26 1/4 inches (est.)

Size [Sight]:

15 1/2 inches by 24 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes:

“8 of This Complete — All Polished”

“Center of Hand Wheel of Friction Gear”

“Composition Metal. Highly Polished” [Outer Hub Cap of Roller]

“Composition Metal. Turned All Over” [Roller]

“Polished Nut” [Inside end of roller axle]

Signature/Initials: “Monitor/C. W. M.” [Pencil]

“ ‘Monitor’/C. W. M.” [Ink]

Rendered: ca. October 1861 (est.)

Original:

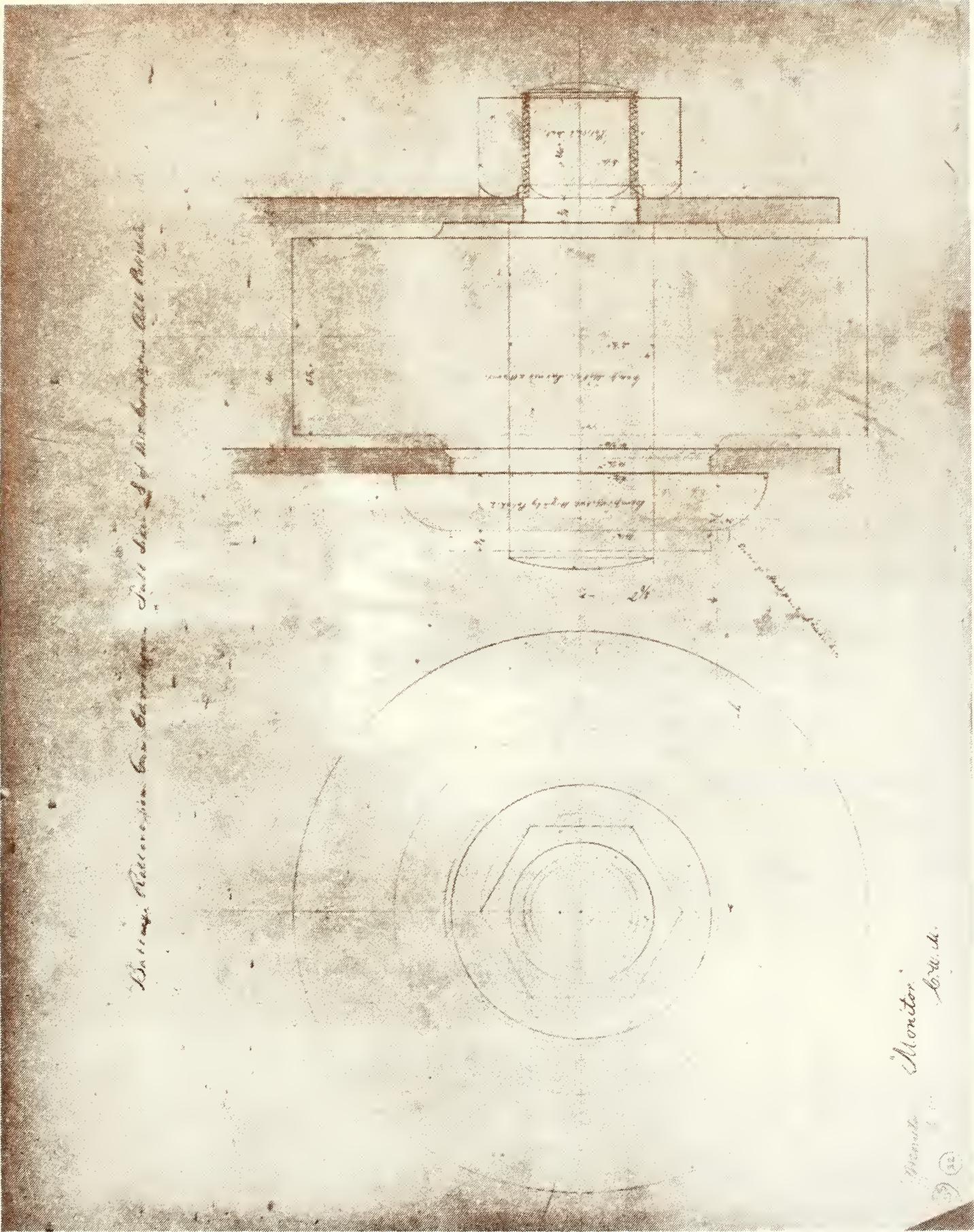
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 32(105)

Condition: Excellent

Remarks:

This drawing shows a front and transverse elevation of one of the four rollers that bear the weight of the gun carriage on the rails. The rollers are enclosed within the frames.



191. "BATTERY' ROLLERS FOR GUN CARRIAGES" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 192

Title: "GUN CARRIAGE-GUIDE ROLLERS"

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on paper.

Size [Sheet]:

13 1/2 inches by 21 1/2 inches (est.)

Size [Sight]:

9 5/8 inches by 18 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: Full (est.)

Notes:

"8 of this. Rough finish."

"17 inches from Centre Line of Carriage." [Axle of Guide Roller]

"Under Side of bottom of carriage" [Outside of Roller Bracket]

"Iron" [Roller Axle]

"Composition Metal" [Roller]

Signature/Initials: "Monitor/Capt. Ericsson" [Pencil]

" 'Monitor'/Capt. Ericsson" [Ink]

Rendered: ca. October 1861 (est.)

Original:

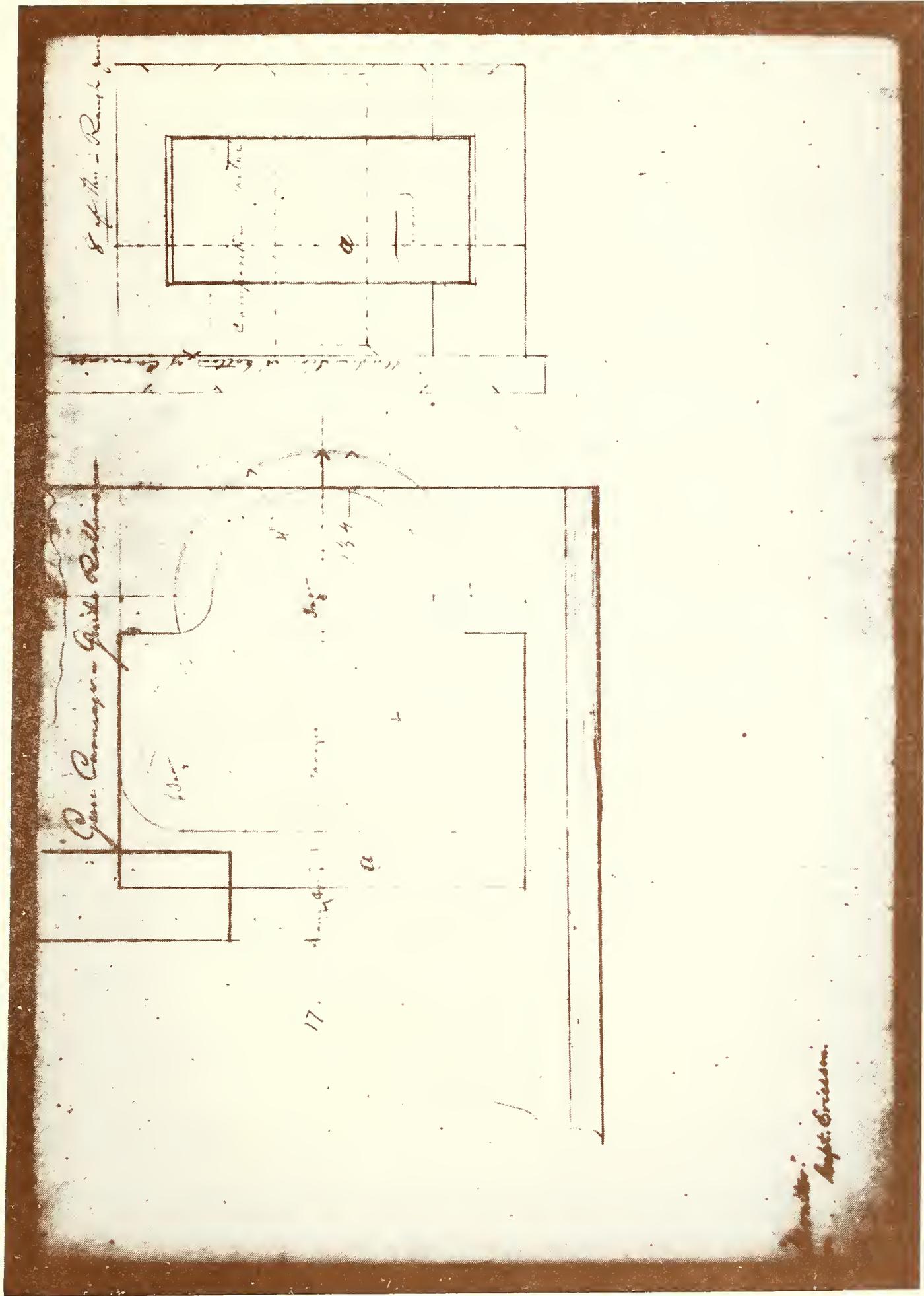
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 21(105)

Condition: Excellent

Remarks:

Four of these horizontal rollers are located at the underside corners of the gun carriage and bear against the sides of the gun rails. This arrangement keeps the guns on their tracks when they recoil and are run back into battery.



192. "GUN CARRIAGE-GUIDE ROLLERS" (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 193

Title: Gun Carriage Friction Gear

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Pencil on buff paper.

Size [Sheet]:

12 3/4 inches by 20 1/2 inches (est.)

Size [Sight]:

11 1/2 inches by 19 1/2 inches (est.)

Inscribed:

Scale: 3 inches = 1 foot (est.)

Notes:

“Transverse Section” [Gun Carriage Friction Gear]

“Screw placed Right and Left in the Two Carriages” [Friction Gear Spindle]

Signature/Initials: “Monitor/Made by Capt. Ericsson” [Pencil]
“ ‘Monitor.’/Capt. Ericsson” [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 22(147)

Condition: Poor

Remarks:

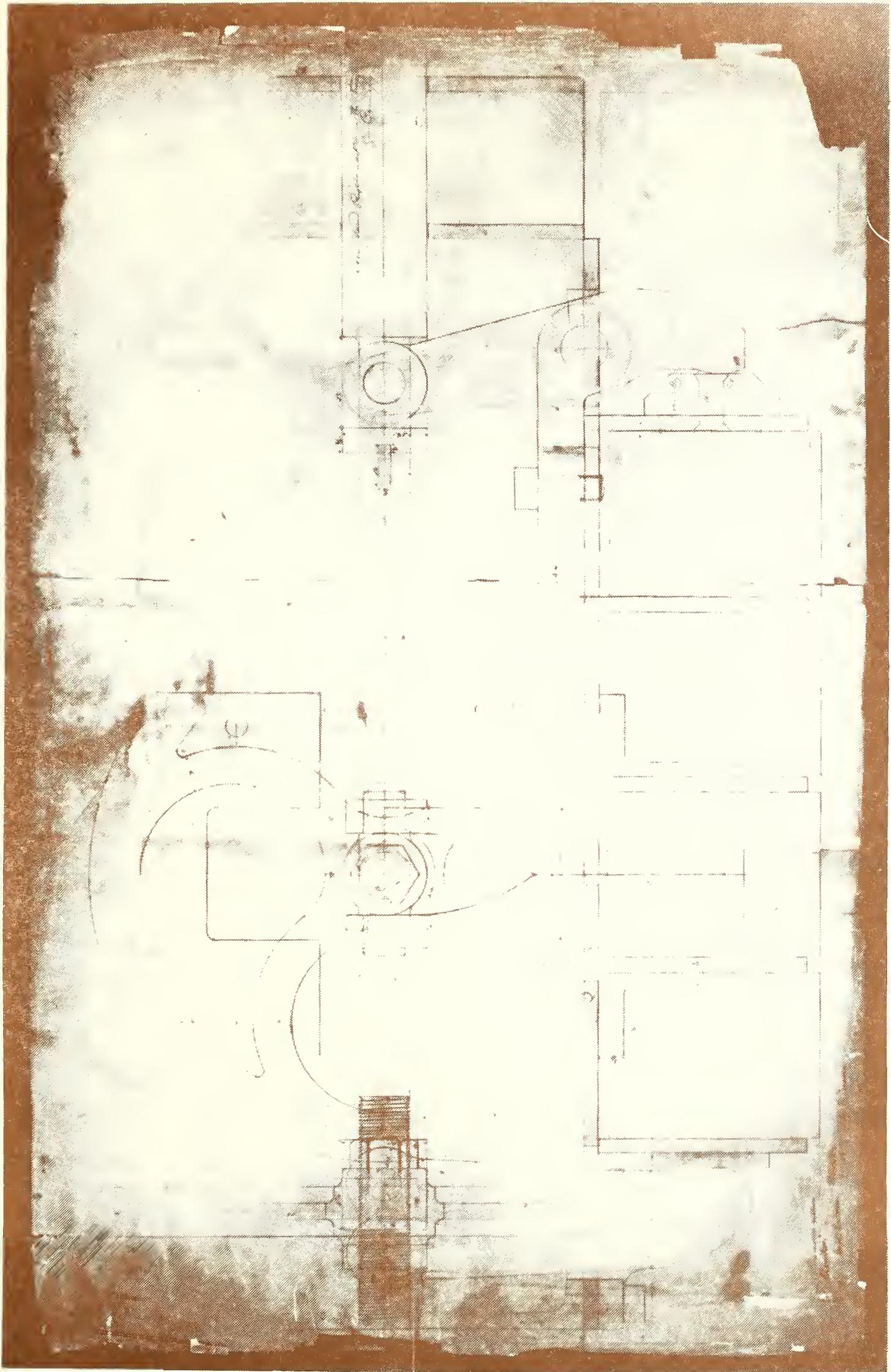
This drawing shows an elevation of a transverse section of the gun carriage friction gear. The compressor wheel turns an “axle tree” carrying two “lever boxes” at the extremities of the shaft. The transverse motion of the shaft in the threaded box rotates the upper ends of the levers. The levers, pivoted on their fulcrums at the ends of a saddle bar bolted to the carriage bottom plate, act on the shoes of the outer friction plates. The five iron friction plates are suspended by L-shaped wedges placed in the slots of the tangs of friction plates which protude through the carriage bottom plate. The levers compress or release the pressure on the friction plates between the wooden friction slides that are bolted at their ends to the turret floor. Ericsson intended to have the compressor

mechanism operate so that the right and left gun compressor wheels would be turned in the same direction from the front of the carriage. This would have required right and left hand threads for the compressor shaft, but time did not allow the plan to be carried out. As a result, both carriages had right-hand threads¹ and the confusion of the initial test-firing of the guns was a near disaster².

Footnote:

¹ Edward M. Miller, editor, *Project CHEESEBOX*, Vol. 1, Annapolis: U.S. Naval Academy, 1974, p. 192.

² Cf. Catalog No. 204.



193. Gun Carriage Friction Gear (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 194

Title: "BATTERY. HANDWHEEL FOR GUN-CARRIAGES."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on buff paper.

Size [Sheet]:

20 3/4 inches by 26 1/4 inches (est.)

Size [Sight]:

19 1/4 inches by 23 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "Full Size"

Notes: "Two of This. Composition. Brilliant Metal. Polished"

Signature/Initials: "Made by C.W.M." [Pencil]
" 'Monitor.'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

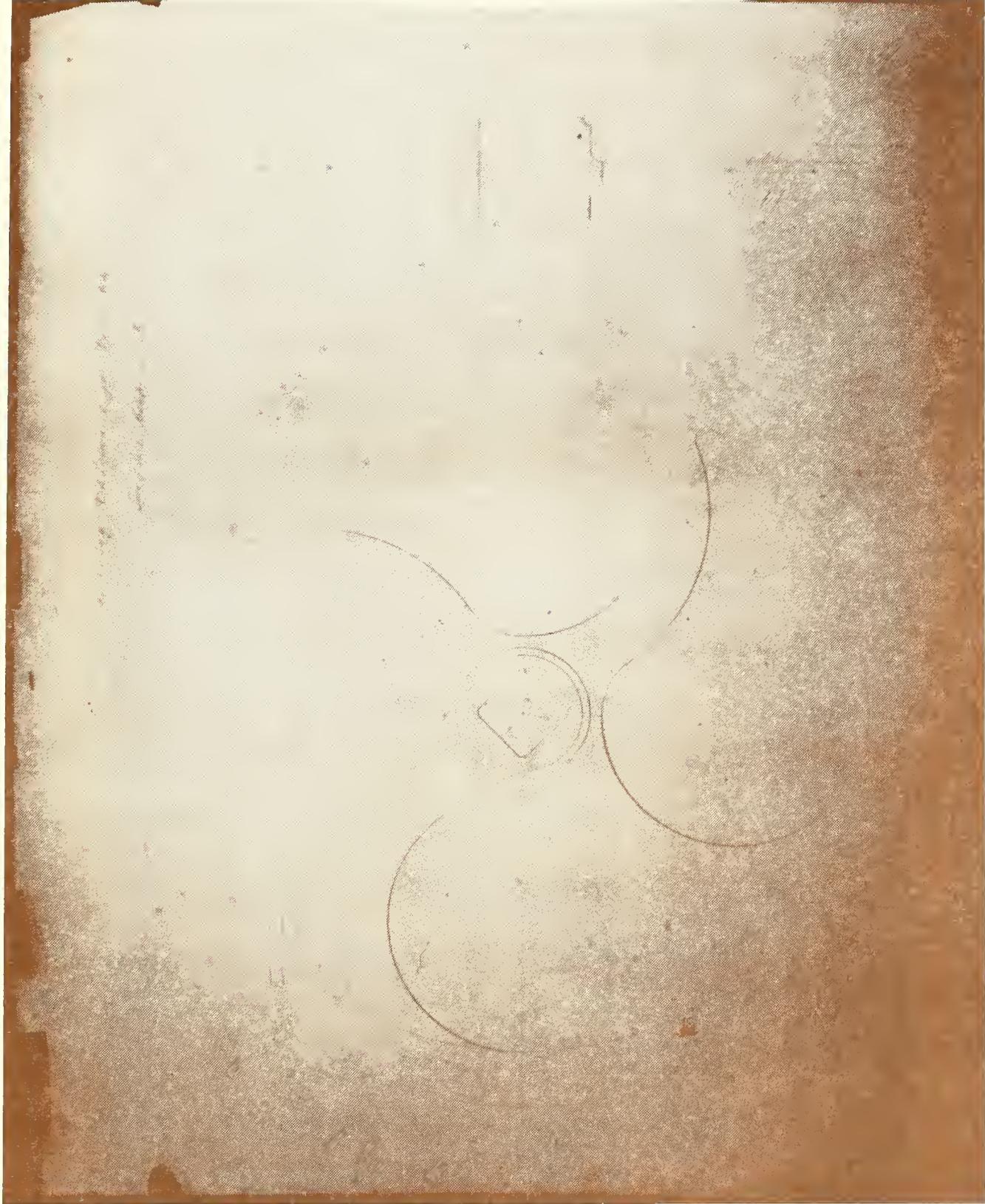
Location: Stevens Institute of Technology
S.C. Williams Library
MacCord Collection

Identification: Drawing No. 11(126)

Condition: Excellent

Remarks:

This drawing shows a front elevation and a transverse section of the 18-inch-diameter check wheel used to operate the compressor mechanism of the gun carriage friction gear.



194. " BATTERY. HANDWHEEL FOR GUN-CARRIAGES." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 195

Title: " 'BATTERY.' SPINDLE AND THIMBLES FOR FRICTION GEAR OF GUN-CARRIAGES."

Date of Subject:

ca. October 1861 (est.)

Draftsman/Life Dates:

Charles William MacCord (1836-1915)

Medium: Pencil on paper.

Size [Sheet]:

12 inches by 27 1/4 inches (est.)

Size [Sight]:

11 inches by 25 7/8 inches (est.)

Inscribed:

Title Block/Caption: See title.

Scale: "Full Size"

Notes:

"Two of This Complete. Wrought Iron. Polished"

"Extreme Length. 4 feet 2 1/2"."

"Hub of Hand-wheel"

Signature/Initials: "Monitor/Capt. E (deleted)" [Pencil]

" 'Monitor'/C.W.M." [Ink]

Rendered: ca. October 1861 (est.)

Original:

Location: Stevens Institute of Technology

S.C. Williams Library

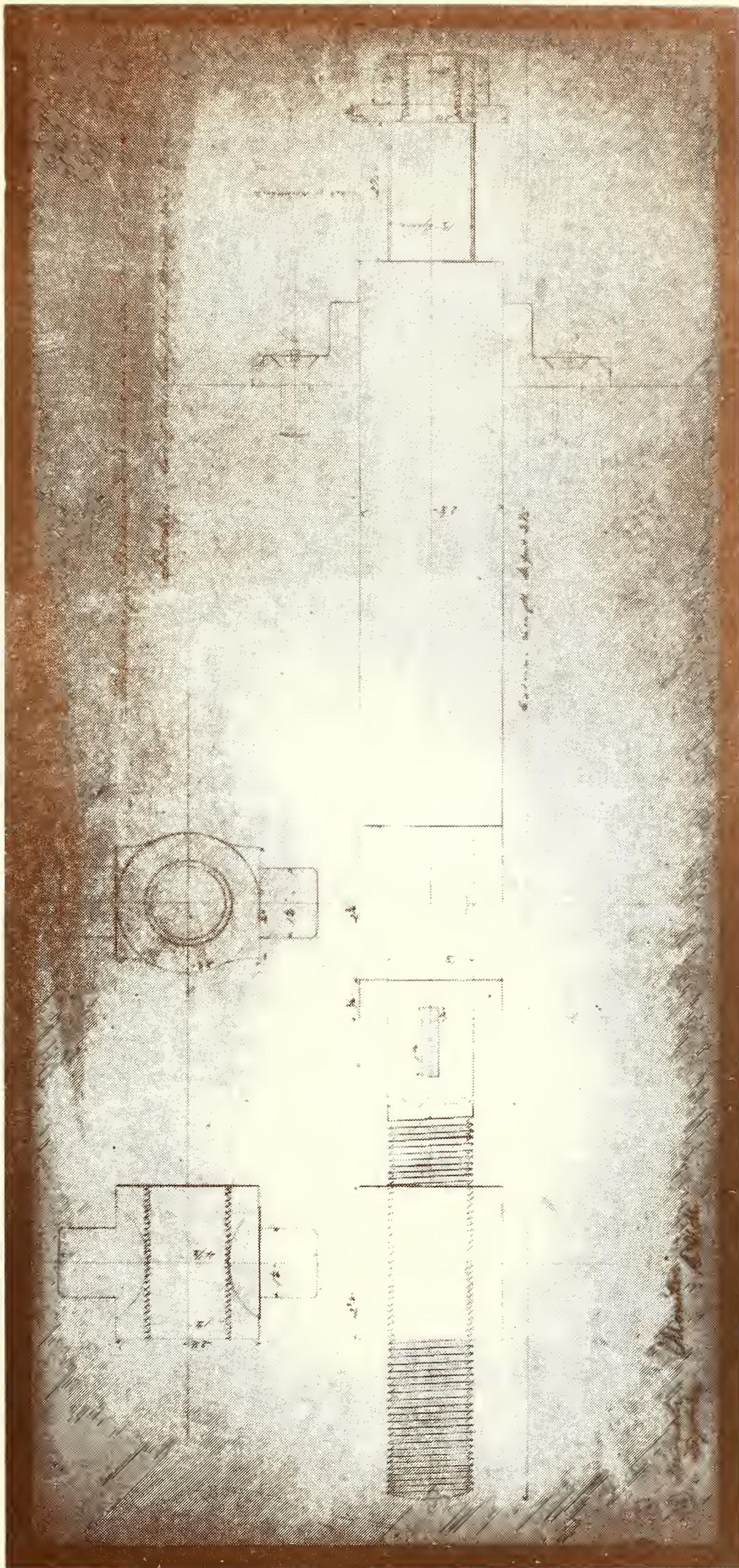
MacCord Collection

Identification: Drawing No. 34(126)

Condition: Excellent

Remarks:

This drawing depicts a longitudinal section of the spindle [check shaft], thimbles [sleeves], sleeve collar and key, the screw, and the hand-wheel hub, bearing, and nut. This 2 1/2-inch-diameter 4-foot-2 1/2-inch shaft transmits the motion of the handwheel to the compressor levers of the gun carriage friction gear.



195. " 'BATTERY' SPINDLE AND THIMBLES FOR FRICTION GEAR OF GUN-CARRIAGES." (Stevens Institute of Technology)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 196

Title: "XI^{IN} GUN-CARRIAGE IN TURRET OF MONITOR./PLATE NO. 2."

Date of Subject:
October 1862

Draftsman/Life Dates:
Unknown

Medium: Black, blue and red ink on tracing cloth.

Size [Sheet]:
30 1/4 inches by 23 inches

Size [Sight]:
24 1/2 inches by 20 1/4 inches

Inscribed:

Title Block/Caption: "See title

Scale: "1/4 Size,"

Notes: "Rear View."

"Transverse Section near rear end of Carriage."

"View from above."

Signature/Initials: "Office of Ordnance Yard. Washington, D.C."

Rendered: "October 1862."

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry
202A, Ordnance Plans, Drawing No. 2804

Condition: Good. Staining and wrinkling around edges.

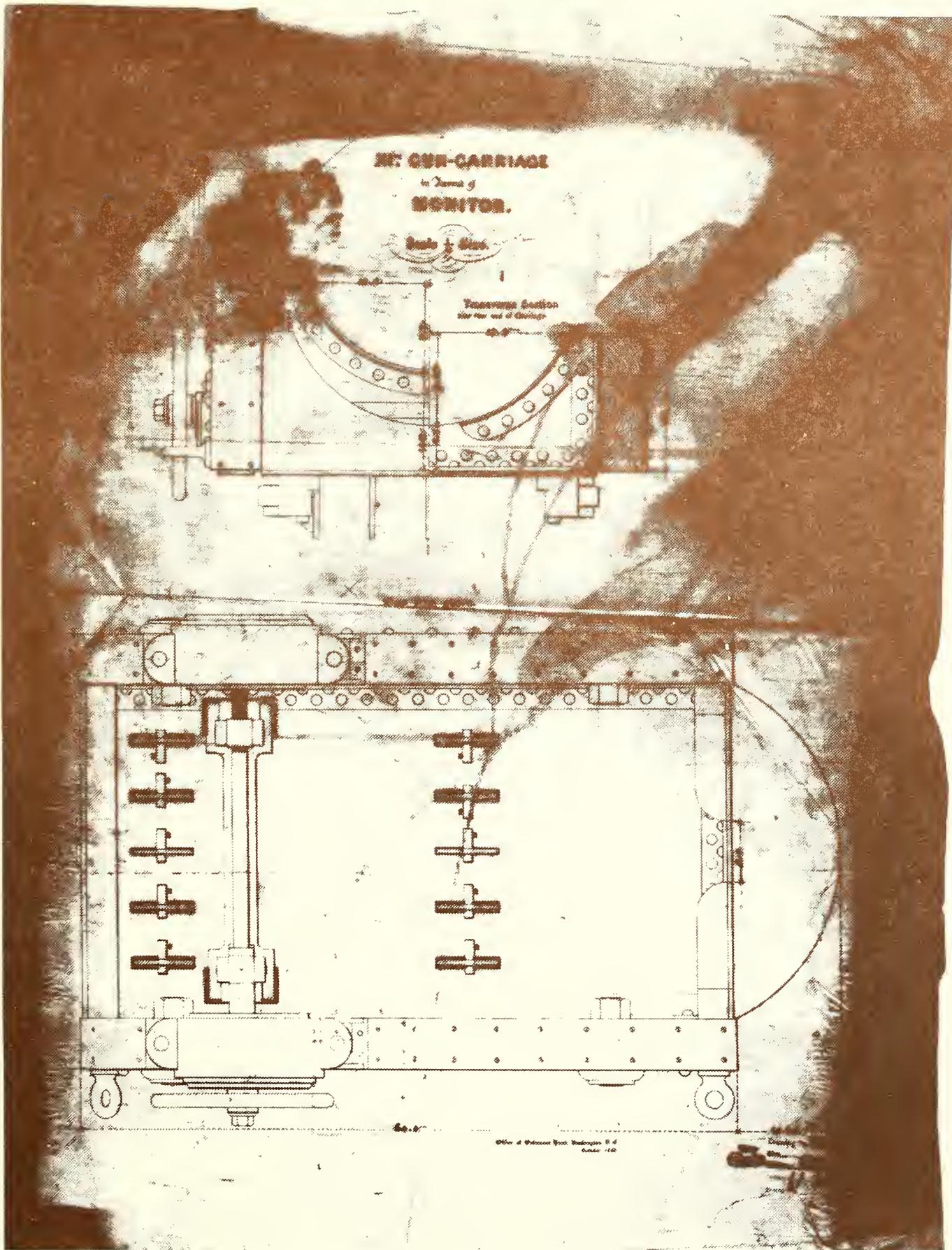
Remarks:

This drawing shows a transverse section of the gun carriage detailing the riveting of angle iron on the front and end transoms. The top view shows the scheme of slotting the bottom plate to accommodate the tangs of the friction plates. With this arrangement the outer friction plates move toward the central friction plate on compression.

This drawing is probably the second of a series of eight¹ made of the gun carriage by the Office of the Ordnance Yard while the *Monitor* was under overhaul at the Washington Navy Yard in October 1862.

Footnotes:

¹ Cf. Cata. No. 202.



196. "XI^{IN} GUN CARRIAGE IN TURRET OF MONITOR./PLATE NO. 2." (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 197

Title: "XI^N GUN CARRIAGE IN TURRET OF MONITOR./ARRANGEMENT OF SLIDES/PLATE NO. 3." [Obverse] [Reverse]

Date of Subject:
October, 1862

Draftsman/Life Dates:
Unknown

Medium: Black, blue, red and yellow ink on tracing cloth.

Size [Sheet]:
36 inches by 23 3/4 inches

Size [Sight]:
31 1/2 inches by 22 1/2 inches
[Obverse]
7 1/2 inches by 19 inches [Reverse]

Inscribed:

Title Block/Caption: See title

Scale: "1/10 Size." [Slides]
"1/4 Size." [Carriage]

Notes: "Part of Longitudinal section."
"Cross Section"
"Centre Line."
"Plan."
"Longitudinal section of Carriage."

Signature/Initials: "Office of Ordnance Yard. Washington, D.C."

Rendered: "October 1862."

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2804

Condition: Good. Staining and wrinkling around edges.

Remarks:

The upper view of this drawing shows the arrangement of the gun rails and friction slides. From the color coding it appears that the gun rails are metal and the friction slides wood. The lower view is an elevation of the side of the gun carriage and gives the dimensions of the vertical, iron friction plates suspended below the carriage from front

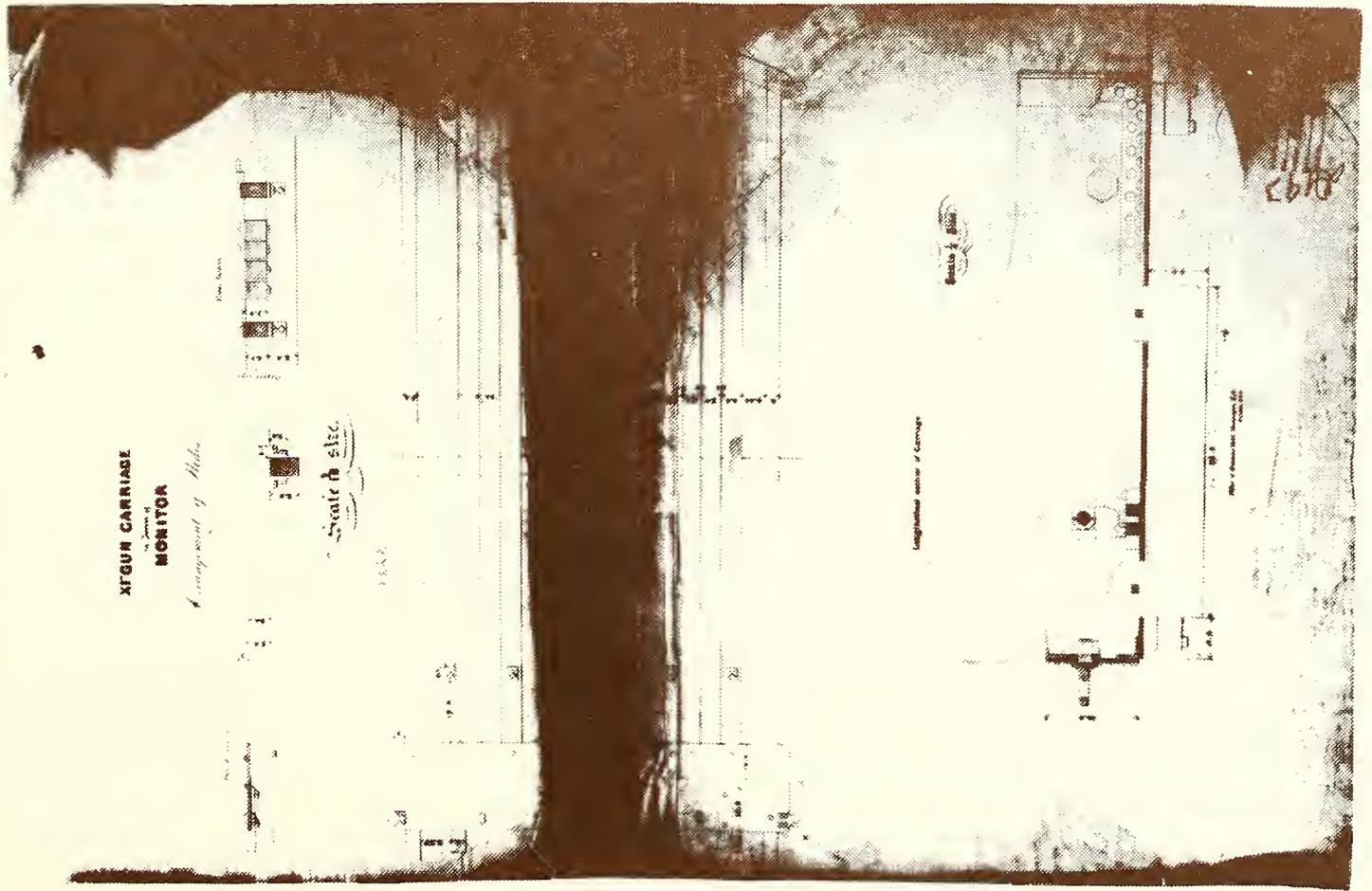
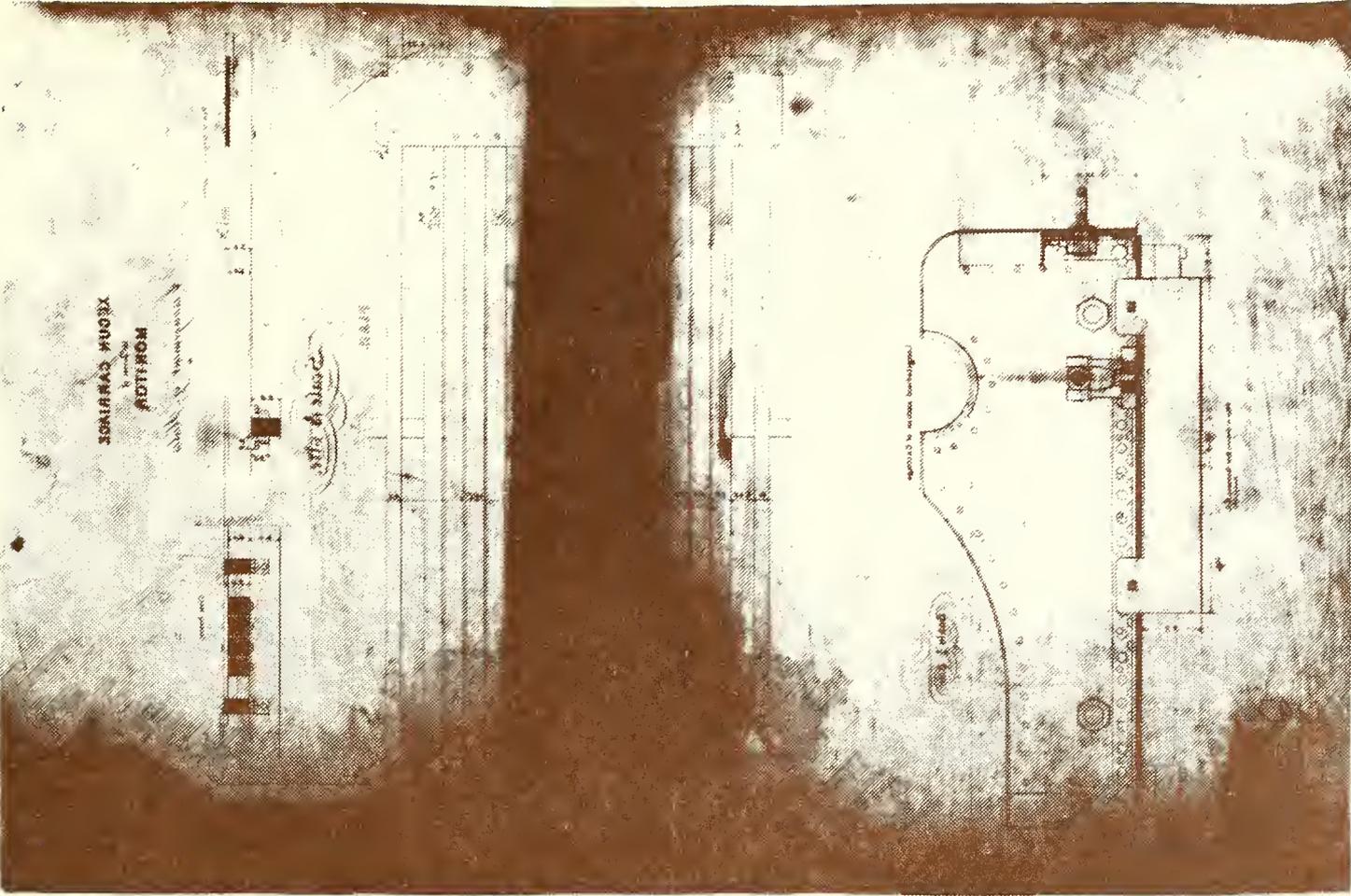
and rear tangs, the height of the front and rear transoms, and the location of the central eye bolt on the front transom. This eyebolt and the one on the center of the forward spreader plate were probably rigged with a preventer to limit the recoil of the gun in case of a compressor malfunction. Both views of the slides show two pairs of forward "hurters," short sections of angle iron bolted to the tops of the outer slides to limit the forward motion of the guns.

A tracing of a portion of the lower drawing appears in black ink on the reverse side of the sheet and shows a longitudinal section of the inner side of the left bracket and the compressor friction plates.

This drawing is probably the third of a series of eight¹ made of the gun carriage by the Office of the Ordnance Yard when the *Monitor* was being overhauled at the Washington Navy Yard in October 1862.

Footnotes:

¹ Cf. Cata. No. 202.



197. "XI IN GUN CARRIAGE IN TURRET OF MONITOR. / ARRANGEMENT OF SLIDES / PLATE NO. 3." [Obverse] [Reverse] (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 198

Title: "XI^N GUN CARRIAGE IN TURRET OF MONITOR./ARRANGEMENT OF SLIDES/PLATE 3."

Date of Subject:
October 1862 (est.)

Draftsman/Life Dates:
Unknown

Medium: Black, blue and brown ink on white paper.

Size [Sheet]:
18 1/8 inches by 22 7/8 inches

Size [Sight]:
14 1/2 inches by 22 1/2 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/10 Size."

Notes: "Part of Longest Section."

"Transverse Section."

"Arrangement of Slides."

"Plan."

"Sangamond's¹ timber is 6" by 7" instead of 5" by 6", as above." [pencil]

Rendered: October 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2807

Condition: Excellent, but stained.

Remarks:

This drawing shows elevations of a longitudinal view of the longest, or inner, gun friction slides; a transverse section of the rails and compressor friction slides of one gun; and a plan view of the rails, friction slides, and tie plates for both guns. The drawing also shows the carriage front hurters mounted on the top of the two outer friction slides as well as the fore and aft outer and the central tackle eyes mounted on the tie plates.

This drawing is probably a version of the third of a series of eight² prepared by the Office of the Ordnance Yard when the *Monitor* was being overhauled at the Washington Navy Yard in October, 1862.

Footnotes:

¹ the U.S.S. *Sangamon*, a *Passaic* Class monitor, launched: October 27, 1862.

² Cf. Cata. No. 202.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 199

Title: "XI^{IN} GUN CARRIAGE IN TURRET OF MONITOR./DETAILS OF THE CAP SQUARES./TRUCKS./FRICTION ROLLERS./PLATE 4."

Date of Subject:
October 1862 (est.)

Draftsman/Life Dates:
Unknown

Medium: Black, red and yellow ink on white paper.

Size [Sheet]:
18 1/2 inches by 23 1/8 inches

Size [Sight]:
16 1/2 inches by 17 1/2 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/4 Size."

Notes: "Details of Cap Squares./Front View./Side View./Cross Section./Rear View./View from above./Cap-Square. Bolts, &c./View from below."
"Details of Trucks with their Boxes./Front View of Truck./Outside View./View from above./Nut of Axle./Horizontal Section."
"Friction Rollers Below Bottom Plate./Front./Side./Vertical Section./View from below./Horizontal Section./Axle."

Rendered: October, 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2809

Condition: Excellent.

Remarks:

This drawing gives the detailed dimensions for the cap squares, or bearings, for the gun trunnions and bolts in eight views; the trucks of the carriage, which bear the weight of the guns, in five views; and the horizontal rollers, that confine the carriage between the rail, in six views.

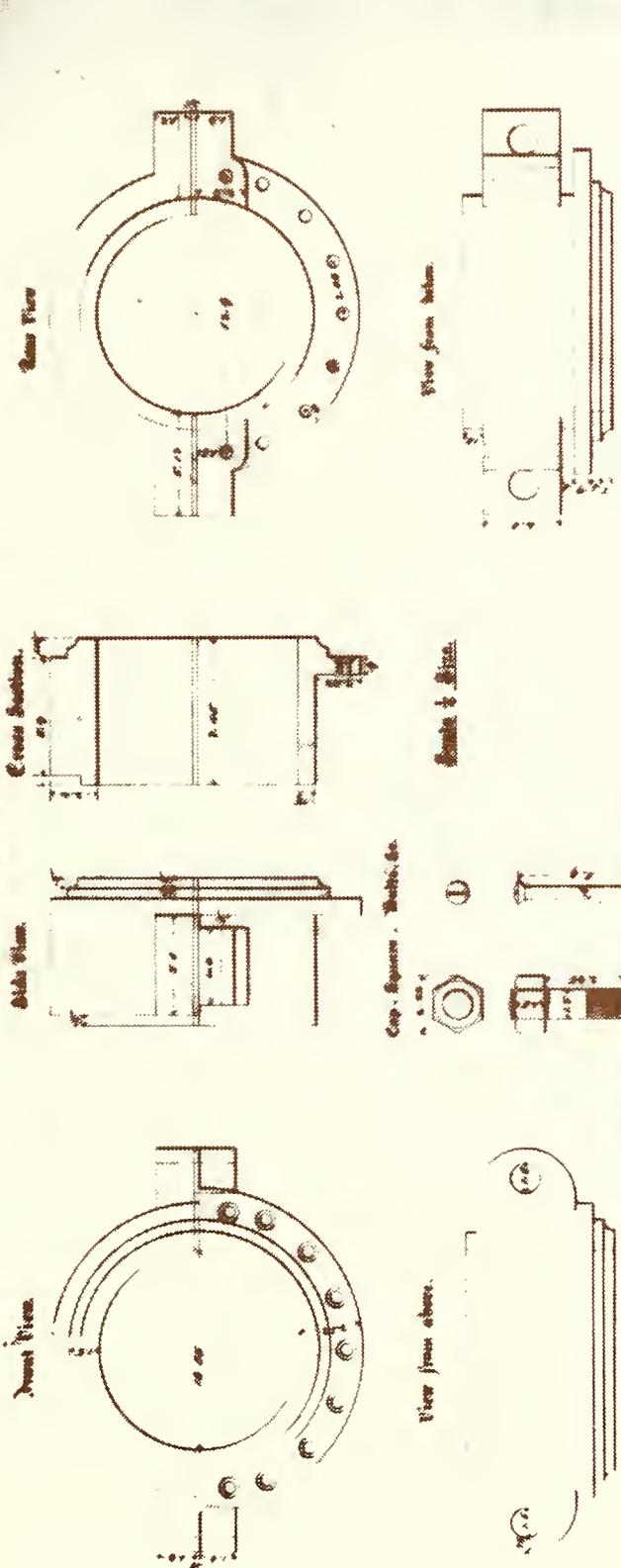
This drawing is probably the fourth in a series of eight¹ made by the Office of the Ordnance Yard when the *Monitor* was being overhauled at the Washington Navy Yard in October, 1862.

Footnotes:

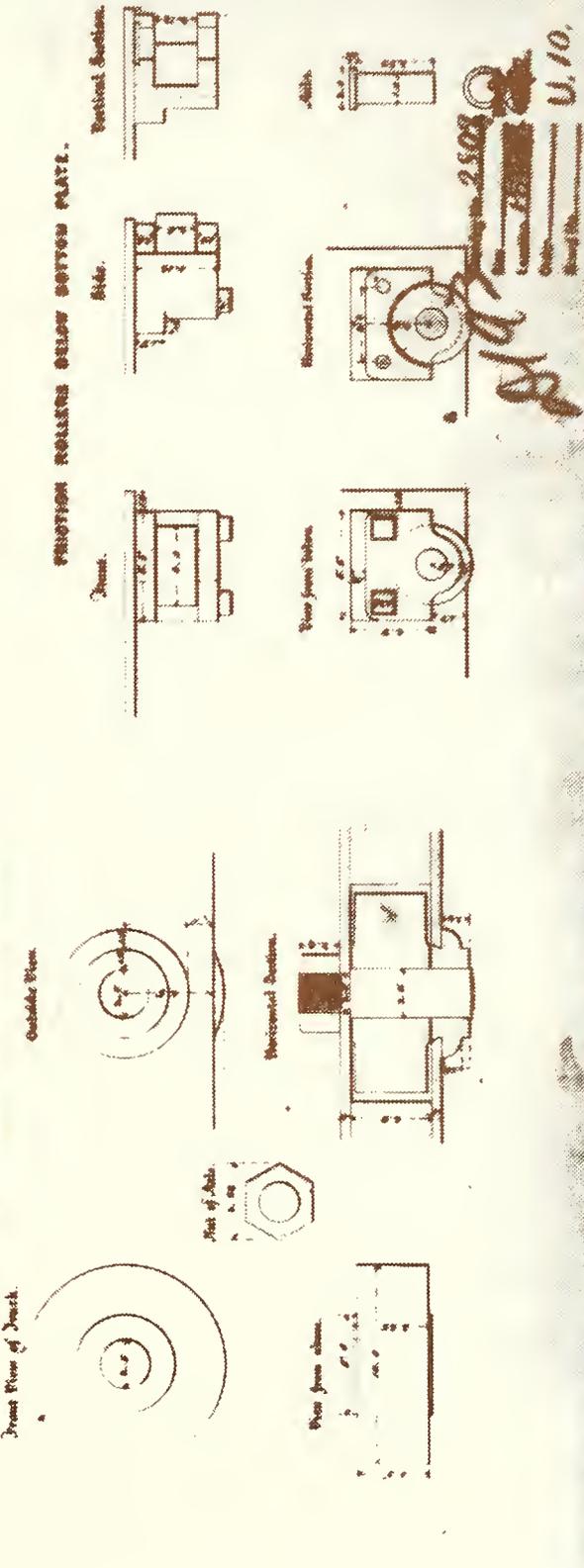
¹ Cf. Cata. No. 202.

XI: GUN CARRIAGE in Turret of MONITOR.

DETAILS OF GAP SQUARES.



DETAIL OF TRUSSES WITH THEIR BASES.



199. "XI" IN GUN CARRIAGE IN TURRET OF MONITOR./DETAILS OF CAP SQUARES./TRUCKS./FRICTION ROLLERS./ PLATE 4." (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 200

Title: "XI^{IN} GUN CARRIAGE IN TURRET OF MONITOR/DETAILS OF OUTSIDE FRICTION-PLATES AND WEDGES./FACE-PLATES OF BRACKETS./TRANSOM ANGLE-IRON./ WASHERS OF CAP-SQUARES./AND EYE BOLTS./PLATE 5.

Date of Subject:
October 1862

Draftsman/Life Dates:
Unknown

Medium: Black, blue, brown, red and yellow ink on white paper.

Size [Sheet]:
18 1/8 inches by 22 7/8 inches

Size [Sight]:
17 1/2 inches by 20 1/4 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/2 Size." [Carriage parts]
"Full Size." [Angle iron]

Notes: "Outside friction plate./Side View./View from below./Horizontal Section./Vert. Section."
"Wedges for friction plates."
"Section of face-plate of brackets./Top view of face-plate of brackets."
"Front face-plate of brackets."
"Washers of Cap-Squares."
"Details of Eye-bolts."
"Full size section of angle-iron around tops of transoms."
"Full size section of angle-iron."
"Rear-Transom./Outside View./Inside-View./View from above./Horizontal Section."

Rendered: October 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2808

Condition: Excellent, some staining.

Remarks:

This drawing gives the detailed dimensions for the friction plates of the carriage, the compressor lever pads, and the wedges and keeper screws that support the friction plates on the carriage bottom plate; the upper and lower cap-screw washers; the side and front eye-bolts for the gun in and out and preventer tackle; the face plates that cover the edges of the wooden core of the gun carriage; and the attachment of the angle-iron to the transoms of the carriage.

This drawing is probably the fifth in a series of eight¹ made by the Office of the Ordnance Yard when the *Monitor* was being overhauled in the Washington Yard in October, 1862.

Footnotes:

¹ Cf. Catalog No. 202.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 201

Title: "X^I^NGUN CARRIAGE IN TURRET OF MONITOR./DETAILS OF COMPRESSOR./PLATE 6."

Date of Subject:
October 1862 (est.)

Draftsman/Life Dates:
Unknown

Medium: Black brown, blue and yellow ink on white paper.

Size [Sheet]:
18 1/8 inches by 22 7/8 inches

Size [Sight]:
17 1/2 inches by 20 1/8 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/4 Size."

Notes: "Transverse Section through Trunnions."
"Axletree"
"Front of Wheel."
"Horizontal Section by line A.B."
"Levers."
"Boxes of Axle."

Rendered: October 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2805

Condition: Excellent. Some staining on edges.

Remarks:

This plan shows the assembly of the compressor mechanism for the gun carriage and the details of the handwheel, hub and bearing; the axletree and the fixed lever box retaining ring and key; the fixed and movable lever boxes and trunnions; the lever spreader bar; and the levers.

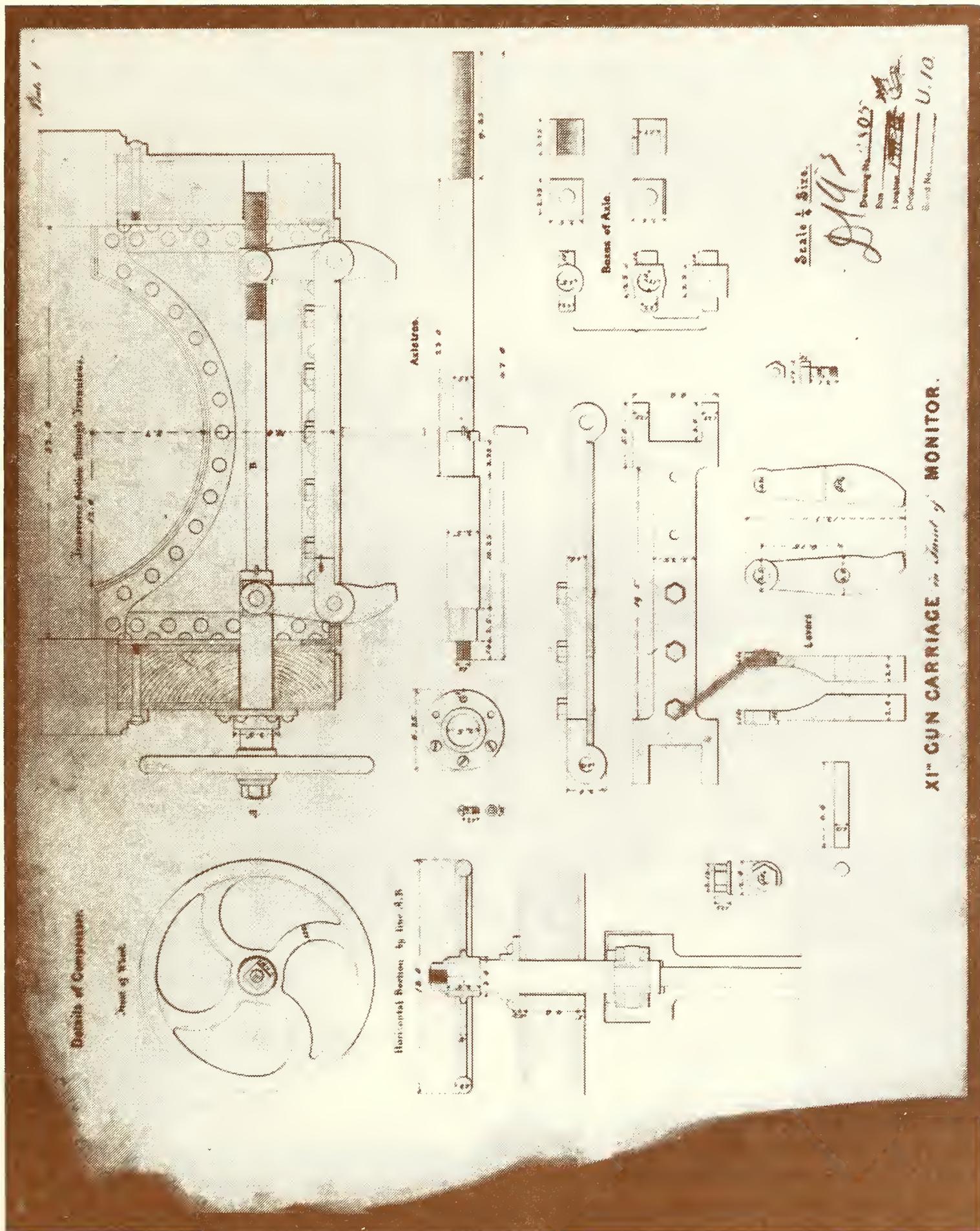
This drawing also shows the parts of the compressor that force the vertical friction plates, suspended from the bottom plate of the gun carriage, against the friction slides in

the floor of the turret to dissipate the recoil. An axletree running below the gun trunnions is operated by a handwheel. Rotation of the handwheel closes or opens the distance between the ends of the two, vertical levers mounted in pivoted boxes, one fixed and the other moved by the screw threads of the axle. The levers are pivoted on their centers at the ends of the spreader bar, which is bolted to the top of the carriage bottom plate. The lower ends of the levers increase or release pressure on the friction slides in the floor of the turret.

This drawing is probably the sixth of a series of eight¹ made by the Office of the Ordnance Yard when the *Monitor* was being overhauled at the Washington Navy Yard in October, 1862.

Footnotes:

¹ Cf. Cata. No. 202.



201. "XI" IN GUN CARRIAGE IN TURRET OF MONITOR. / DETAILS OF COMPRESSOR / PLATE 6." (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 202

Title: "XI^{IN} GUN CARRIAGE IN TURRET OF MONITOR./DETAILS OF BOTTOM PLATE AND FRICTION-PLATES./PLATE 7."

Date of Subject:
October 1862 (est.)

Draftsman/Life Dates:
Unknown

Medium: Black, blue, brown and red ink on white paper.

Size [Sheet]:
18 1/8 inches by 22 7/8 inches

Size [Sight]:
16 1/2 inches by 18 3/4 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/4 Size."

Notes: "Details of Bottom-Plate and Friction Plates."
"View from below."
"Transverse Section."
"8 Sheets" [Pencil]

Rendered: October 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A, Ordnance Plans, Drawing No. 2810

Condition: Excellent.

Remarks:

This drawing shows a bottom view of the bottom-plate of the gun carriage and emphasizes the locations of the horizontal friction rollers and the slots for the tangs of the friction plates and the compressor levers. The transverse section shows the function of the wedges that support the friction plates and the dimensions of the compressor lever pads. The upper, outboard corners of the outer friction slides are rounded. The slots in the bottom-plate, that admit the tangs of the friction-plates, increase in width in proportion to their distance from the center, thereby providing space for the accumulative movement of the friction-plates and the resultant, horizontal transverse bending of the wooden friction slides.

A penciled note indicates that this sheet is one of a series of eight probably made by the Office of the Ordnance Yard when the *Monitor* was being overhauled at the Washington Navy Yard in October, 1862. Seven of this series are possibly represented by this drawing and Catalog Nos. 196-201 and 203. "Plate No. 1" of this series, assumed to be the assembly drawing of the entire gun carriage, has not been located in the Ordnance Plans of the National Archives.¹

Footnote:

¹ Cf. Cata. No. 204.

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 203

Title: "XI^{IN} GUN CARRIAGE IN TURRET OF MONITOR./BRACKETS/PLATE 8."

Date of Subject:

October 1862 (est.)

Draftsman/Life Dates:

Unknown

Medium: Black, blue, brown and yellow ink on white paper.

Size [Sheet]:

18 1/8 inches by 22 7/8 inches

Size [Sight]:

16 1/4 inches by 19 inches

Inscribed:

Title Block/Caption: See title

Scale: "1/4 Size."

Notes: "Longitudinal Section of Brackets."
"Side-Plates of Brackets"

Rendered: October 1862 (est.)

Original:

Location: National Archives
Washington, D.C.

Identification: Record Group 74, Records of the Bureau of Ordnance, Entry 202A,
Ordnance Plans, Drawing No. 2806

Condition: Excellent.

Remarks:

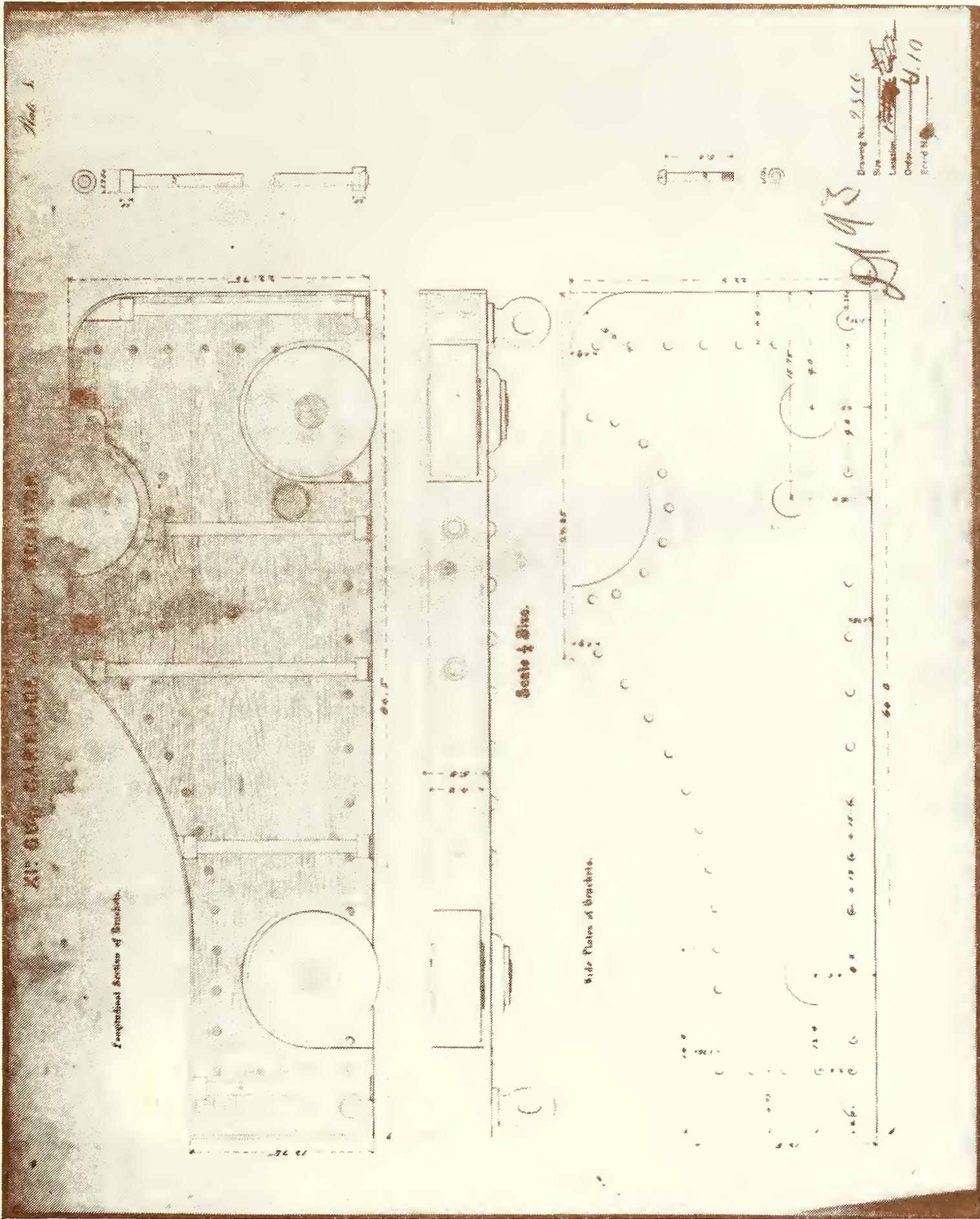
This drawing shows the construction of the two brackets that support the 11-inch guns of the *Monitor's* turret. The top view shows the seven, 1-inch diameter, vertical bolts that stiffen the 4-inch wooden core between the two 1/2-inch iron side-plates, the trunnion plates, the cut-outs for the trucks and compressor gear axletree, and the 5-inch-wide iron facings over the top and ends of the wood. The lower ends of the core stiffening bolts are upset against 1-inch-thick washers.

The lower view shows the template of the iron side-plates and the location of the 0.65-inch side screws tapped into the inner plate.

This drawing is probably the eighth in a series of eight¹ made by the Office of the Ordnance Yard while the *Monitor* was being overhauled at the Washington Navy Yard in October 1862.

Footnote:

¹ Cf. Cata. No. 202.



203. "XI" IN GUN CARRIAGE IN TURRET OF MONITOR./BRACKETS/PLATE 8."
 (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 204

Title: "XI" GUN-CARRIAGE OF THE ORIGINAL 'MONITOR.' "

Date of Subject:

October 1861 (est.)

Draftsman/Life Dates:

John Ericsson (1803-1889)

Medium: Black and white photographic negative

Size [Sheet]:

4 inches by 6 inches

Size [Sight]:

2 3/8 inches by 3 1/2 inches

Inscribed:

Title Block/Caption: See title

Scale: "3 ins. = 1 Foot."

Notes: "Wrought Iron, & Brilliant Composition Metal Brightly Polished."

"Bureau of Ordnance

Navy Department

No. 1742, Case C, Drawer 60

Superseded See Rev. 29590."

Signature/Initials: "J. Ericsson"

Rendered: New York, May 14, 1864."

Original:

Location: Naval Historical Center

Washington Navy Yard

Washington, D.C.

Identification: Ordnance Plans (Uncataloged File)

Drawing No. 1742.

Condition: Excellent

Remarks:

This plan represents an assembly drawing of the complete gun carriage for the 11-inch gun of the *Monitor's* turret in six views: a plan, side elevation, front elevation, and three, transverse section elevation auxiliary views of the compressor gear. Not indicated, but understood are the instructions that this drawing represents the compressor arrangements for the right gun of the turret—the left gun carriage would be made on the opposite hand to make the compressor wheel available to the crew on the outer side of the carriage. Turning the top of the compressor wheel to the left increased the pressure on the friction gear¹.

This drawing may be similar to the assembly drawing, "Plate No. 1," of the gun carriage missing in the series² produced by the Office of the Ordnance Yard while the *Monitor* was being overhauled in the Washington Navy Yard in October 1862. Although the drawing has been signed by Ericsson and the draftsmanship resembles his techniques, the date, two and a half years after the construction of the *Monitor*, and the use of the word "Original," as well as the insertion of the "XI" in a mismatched lettering style in the title of the drawing suggest that the drawing may have been made some time after the construction of the *Monitor* and autographed later by Ericsson. It seems improbable that Ericsson would have had time to make a new drawing while his monitor, *Puritan*, was under construction in 1864.

This photographic negative was made in the 1960's by the Naval Historical Center from a collection of naval ordnance plans of the Naval Ordnance Plant, Louisville, Kentucky, which were subsequently deposited in the National Archives under Record Group 74, Records of the Bureau of Ordnance, Entry 202 (cataloged) and Entry 202A (uncataloged), Ordnance Plans. The original of this drawing was not located in either entries. From a reduction symbol on the negative and the indicated scale and dimensions the drawing would have the following measurements:

Sheet Size: 22 7/8 inches by 35 inches (est.)

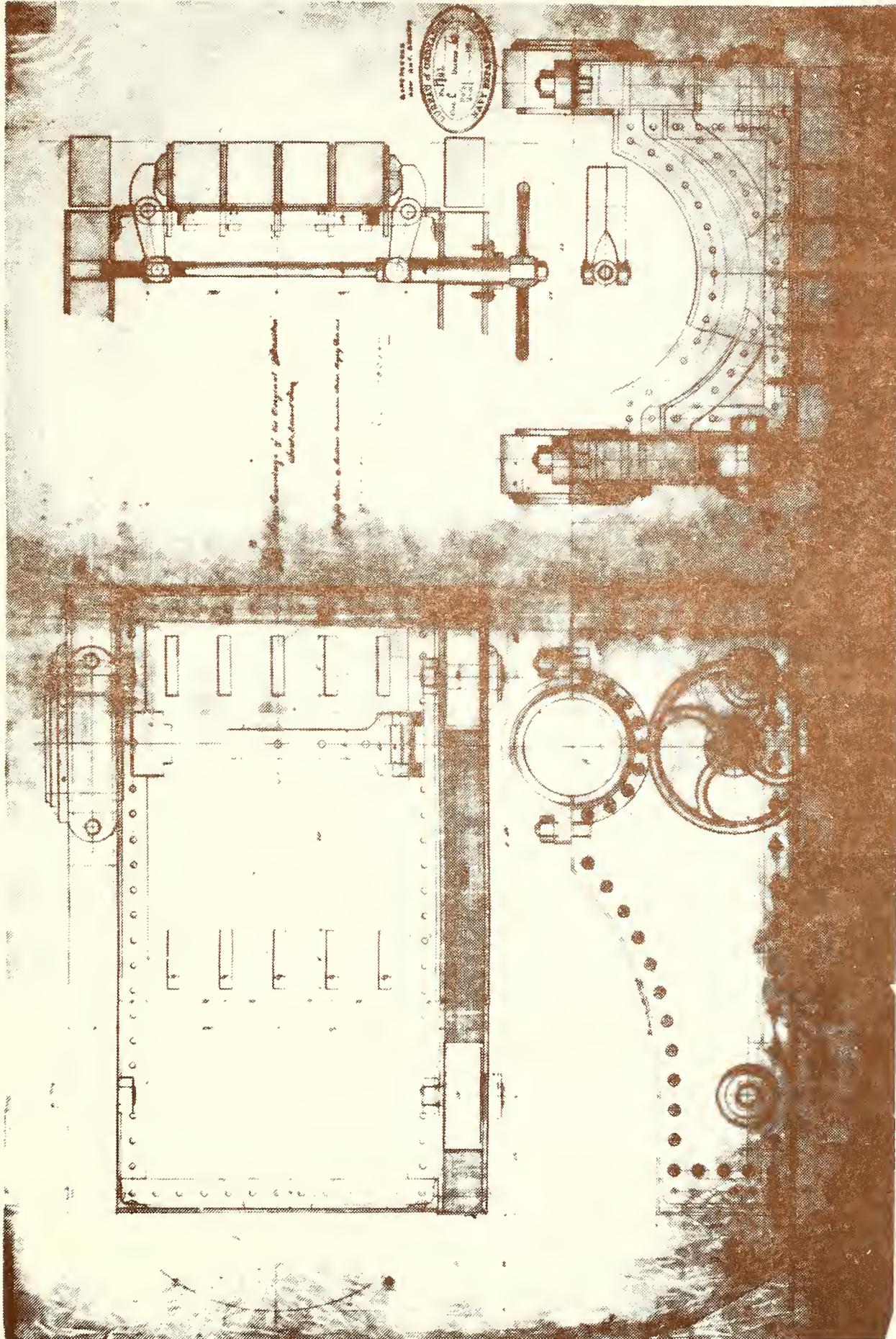
Site Size: 10 1/4 inches by 33 1/8 inches (est.)

The drawing appears to be made on tracing cloth and is probably drawn in black, blue and red or brown ink with pencil shading to represent metal and wood components.

Footnotes:

¹ Ericsson intended to make the compressor mechanisms right and left-handed but due to lack of time the threads of the axletree for both compressors were made right-handed. With this arrangement the compressor wheel of both carriages had to be turned in a counter-clockwise direction to compress the friction gear. During the first firing trials on March 3, 1862, Chief Engineer Stimers misinterpreted the operation of the mechanism and turned the compressor wheel clockwise before the initial firing of both guns, thereby unwittingly releasing, instead of compressing, the friction gear. As a result, the guns recoiled unchecked until the cascabels struck the bulkhead of the turret. Fortunately the damage was limited to the rear guide-rollers being sheared off the bottom-plate of the carriage. Charles W. MacCord, "Ericsson and His 'Monitor'," *North American Review*, July-December, 1889, Vol. 149, pp. 460-471.

² Cf. Catalog No. 202.



204. "XI" GUN-CARRIAGE OF THE ORIGINAL 'MONITOR'." (Naval Historical Center)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 205

Title: "FRICTION-GEAR APPLIED TO THE GUN-CARRIAGES OF THE UNITED STATES IRON-CLAD FLEET."

Date of Subject:

1861-1865

Draftsman/Life Dates:

Unknown

Medium: Engraving

Size [Sheet]:

10 inches by 8 inches

Size [Sight]:

2 1/4 inches by 4 1/2 inches

Inscribed:

Title Block/Caption: "Carriages for Heavy Ordnance. Designed by John Ericsson, 1861/Section Showing the Friction-Gear applied to the Gun-Carriages of the United States Iron-Clad Fleet"

Notes: "Plate 57. See Chap. XXXVII."

Rendered: 1876

Publication:

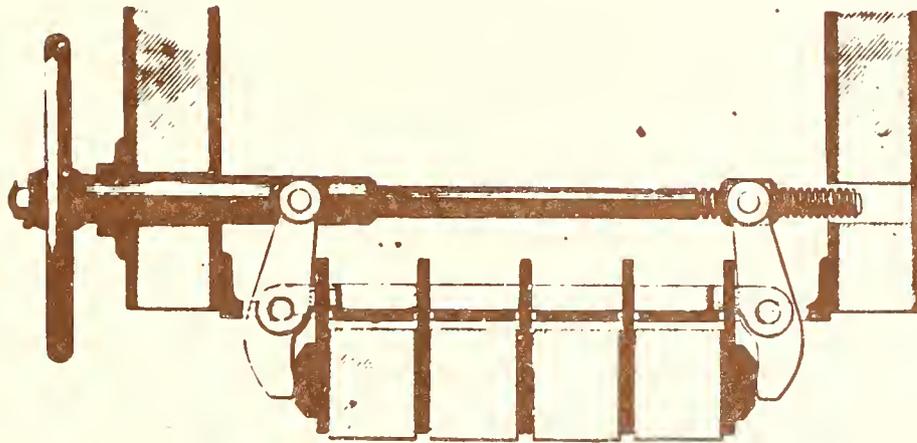
John Ericsson, *Contributions to the Centennial Exhibition*, New York: "Nation" Press, 1876, plate 57.

John Ericsson Papers, Microfilm Edition, American-Swedish Historical Foundation Museum, Philadelphia: Rhistoric Publications, Inc., 1970, reel 8.

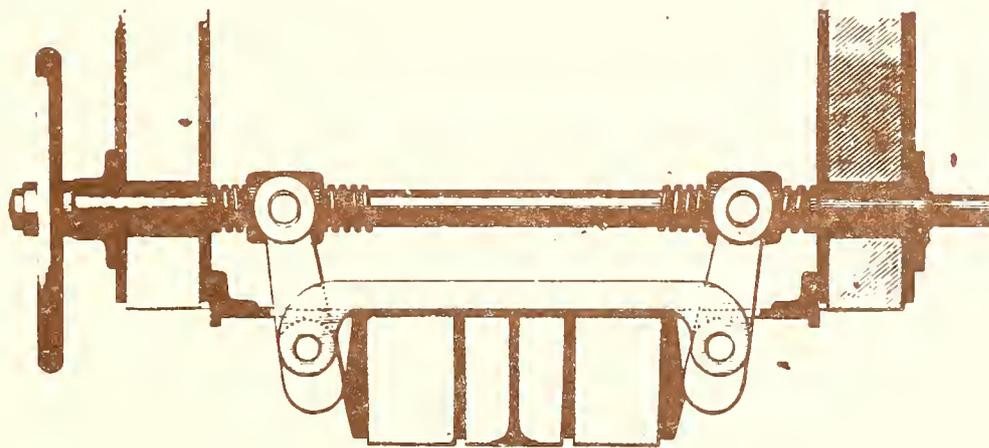
Remarks:

This plate shows a transverse section of the Ericsson friction gear and the "plagiarism" by Captain Scott and Sir William Armstrong.

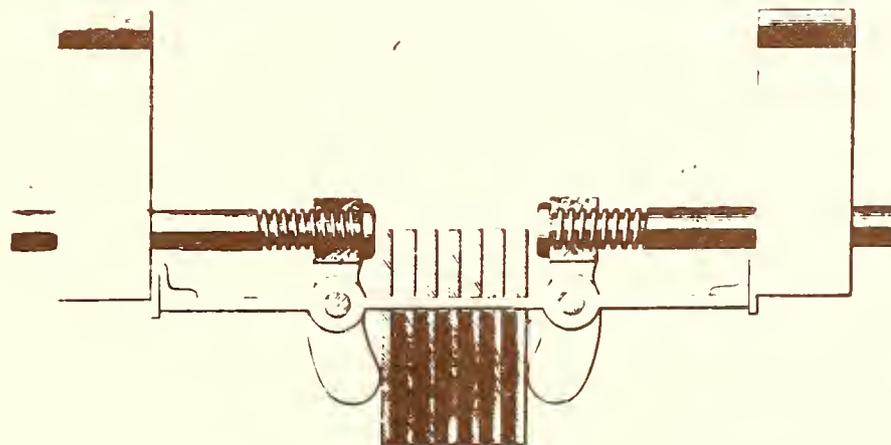
SECTION SHOWING THE HEAVY ORDNANCE DESIGNED BY JOHN ERICSSON, 1861.
SECTION SHOWING THE FRICTION GEAR APPLIED TO THE GUN CARRIAGES
OF THE UNITED STATES IRON CLAD FLEET.



SECTION SHOWING CAPTAIN SCOTT'S PLAGIARISM.



SECTION SHOWING SIR WILLIAM ARMSTRONG'S PLAGIARISM.



205. "FRICTION-GEAR APPLIED TO THE GUN-CARRIAGES OF THE UNITED STATES IRON-CLAD FLEET." (The "Nation" Press)

MISCELLANEOUS

Numbers 206-207

(Late Acquisitions)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 206

Title: "ANCHOR HOISTER. ERICSSONS BATTERY MONITOR."

Date of Subject:
November 1862 (est.)

Draftsman/Life Dates:
Unknown

Medium: Black and red ink and pencil on Manila paper.

Size [Sheet]:
20 7/8 inches by 30 1/4 inches (est.)

Size [Sight]:
19 3/4 inches by 28 3/4 inches (est.)

Inscribed:

Title Block/Caption: See title

Scale: "1 1/2" = One foot"

Rendered: November 1862 (est.)¹

Original:

Location: National Archives

Identification: Record Group 19, Records of the Navy Bureau of Ships, Drawing No. 77-4-12

Condition: Fair. Ends foxed and torn.

Remarks:

This drawing shows a side elevation, plan, and a rear elevation of a transverse section through the main shaft of the hand-powered "anchor hoister," or windlass. The tops of the cheeks are bolted through the deck planking to the underside of the deck beams and to the transverse bulkhead aft of the anchor well on their forward ends. The two, independent hand "brakes," or levers, to be operated by several men manning cross handles, are pivoted on a common shaft on the after end of the cheeks. This shaft carries ratchet wheels on both ends and an 8 1/2-inch-diameter spur gear to the starboard of the center line. The fork of the pivot end of each lever has a weighted pallet that engages the notches of the ratchet wheel when the lever is lowered and rotates the drive shaft counter-clockwise when viewed from starboard. Two pawls on the top of the ratchet wheel prevent the weight of the anchor and chain from running the hoister backwards when the levers are raised and the pallets are disengaged.

The spur gear on the ratchet shaft drives, via a 12-inch-diameter idler gear, the 28-inch-diameter main spur gear, which is free to rotate on the main shaft. The main gear is moved horizontally along the main shaft by a pivoted clutch lever and fork mechanism arranged between the outboard side of the main gear and the starboard cheek. A shoulder on the inboard face of the main gear engages a notch in the end of the central, 17-inch-diameter "chain barrel," or wildcat, the chain barrel is keyed to the main shaft and is designed with five sprockets that engage the links of the anchor chain with an effective diameter of 13 inches. An 8 1/2-inch-diameter chain pulley is mounted on an auxiliary shaft directly below the chain barrel and is grooved to take the anchor chain links.

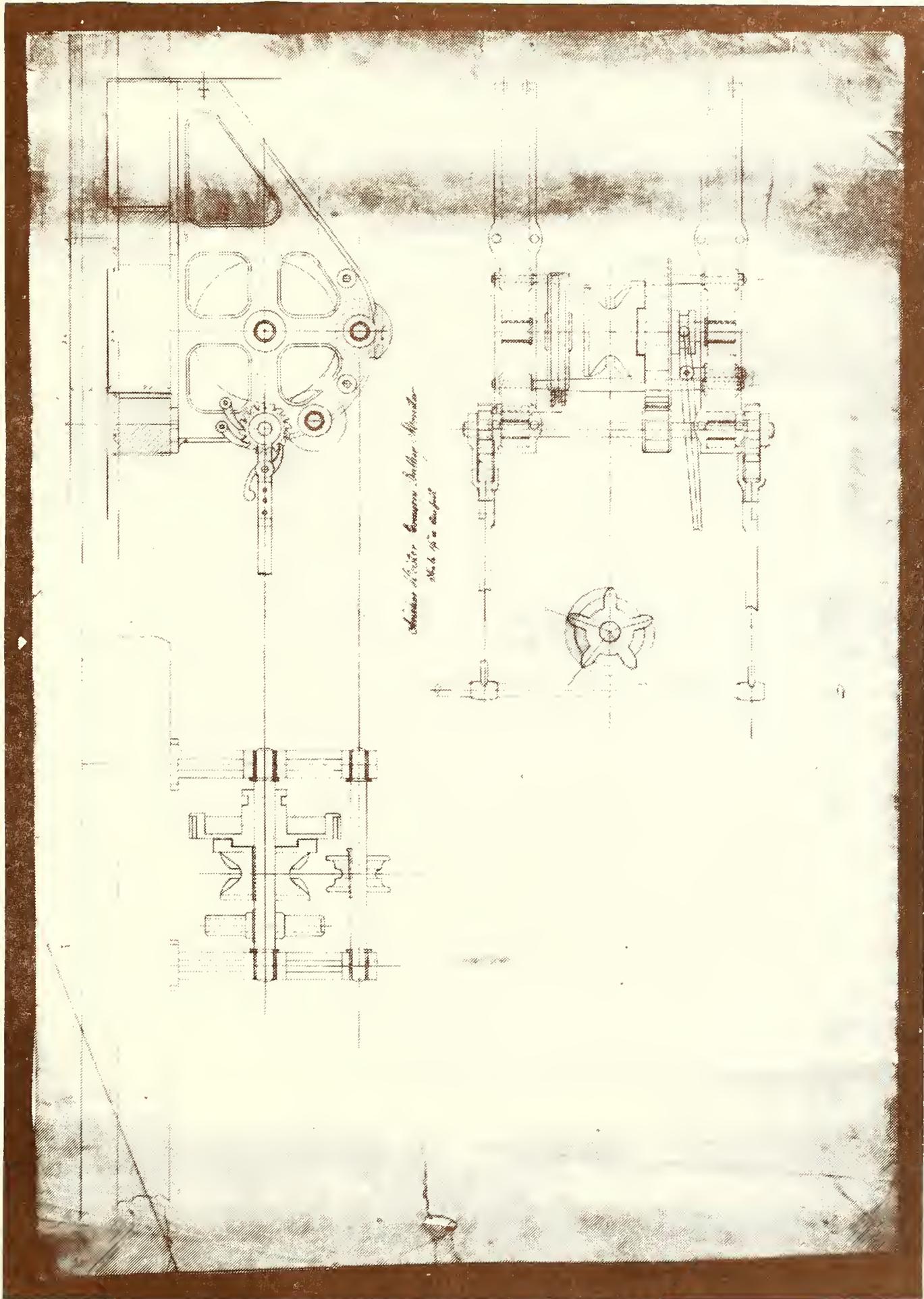
The anchor chain comes from the chain locker below and aft of the hoister; over the chain barrel, forward, down and aft of the china pulley; under, forward and up through the hawse pipe between the forward bulkhead and the anchor well; forward and over the anchor well sheave and down to the anchor. Operation of the levers with the pallets engaged hauls in the anchor.

When the anchor is let go, the rate the chain is paid out is controlled by a friction brake mechanism mounted on the main shaft between the chain barrel and the port cheek. A 21 1/2-inch-diameter brake drum is keyed to the main shaft. The brake is actuated by a hand lever [not shown] that compresses a brake hand against the drum. The ends of the brake band and the lever fulcrum are supported by an angle post fastened to the inside of the port cheek.

The anchor hoister appears to have a theoretical mechanical advantage of about 28. A two-foot motion of the levers would take in about one inch of chain.

Footnote:

- ¹ Church, Ericsson's biographer, claims that Ericsson drew the plans of the anchor hoister, but this drawing is not signed or dated. Although the numerals of the dimensioning appear to be Ericsson's hand, the title does not and may have been added later as Ericsson did not name his Battery, "Monitor," until January 20, 1862 in his letter of that date to Gustavus V. Fox, Assistant Secretary of the Navy. Cf. W.C. Church, *The Life of John Ericsson*, New York: Charles Scribner's Sons, 1906, Vol. 1, pp. 254-255, 259.



206. "ANCHOR HOISTER. ERICSSONS BATTERY MONITOR" (National Archives)

U.S.S. Monitor Drawing Catalog Data Sheet

Catalog No. 207

Title: "TRANSVERSE SECTION OF ERICSSON'S BATTERY."

Date of Subject:
March 9, 1862

Draftsman/Life Dates:
Unknown

Medium: Black and blue ink on tracing cloth.

Size [Sheet]:
11 inches by 20 inches

Size [Sight]:
7 3/8 inches by 17 inches

Inscribed:

Title Block/Caption: See title

Scale: 1 inch = 3 feet (est.)

Notes: "Hull 124 ft. long
34 " breadth at junction with armored raft."
"Armored raft 172 ft. 4 inches long. Sides made of 30 inch oak.
41 " 4 " breadth & covered with 6 inches of armor.
5 " 0 " depth. Deck of oak 7 inches thick covered
with 1 inch armor."
"Raft when going into action was immersed 3 1/2 feet."
"Merrimac's prow was immersed 2 feet below the surface of water
and projected 2 feet from stem."

Rendered: 1882 (est.)¹

Original:

Location: National Archives

Identification: Record Group 46, Records of the U.S. Senate, Papers of the Naval Affairs Committee, Bill S.369, 47th Congress, "Relief for the Crew of the U.S.S. *Monitor*, Folder Sen. 47A-E14.

Condition: Excellent. Folded.

Remarks:

This undated drawing shows a transverse section of the hull. The profile of the lower hull is in error as it shows the side as vertical instead of sloping and the chine curved rather than angular. Although Ericsson's original plan called for six inches of armor on the sides, the plating was reduced to five inches about October 21, 1861². The side armor backing was a combination of oak and pine.

The deck was pine and was covered with two layers of one-half inch iron plates. The berth deck was raised when the *Monitor* was overhauled in Washington in October of 1862, but the modification description³ does not include the indicated massive berth deck beam or such extreme reduction of the overhead⁴. The arrangement of the diagonal bracing, knees, and the deck stanchions are not in agreement with the working drawings⁴.

The hull dimensions listed are quite accurate and the dimensions for the overhang, 3 feet 8 inches, is exactly the distance from the outer edge of the armor shelf to the top of the sloping sides at the midship section. It would appear that the drawing was made by someone who was familiar with the external appearance of the *Monitor* but was estimating the underwater and internal configuration with an interest in the ramming capability of the *Merrimac* (C.S.S. *Virginia*) and the vulnerability of the *Monitor*.

Footnote:

¹ This drawing was found in a collection of papers used by the Senate Naval Affairs Committee to study the 1882 appeal of Rear Admiral Worden for Congress to award \$200,000 prize money to the crew of the U.S.S. *Monitor* for their action against the C.S.S. *Virginia*. The appeal was denied in 1884.

² Cf. Drawing Nos. 65 and 148.

³ Keeler, p. 233.

⁴ Cf. Drawing No. 43.

Transverse section of Ericsson's Battery.

Ball mark deep

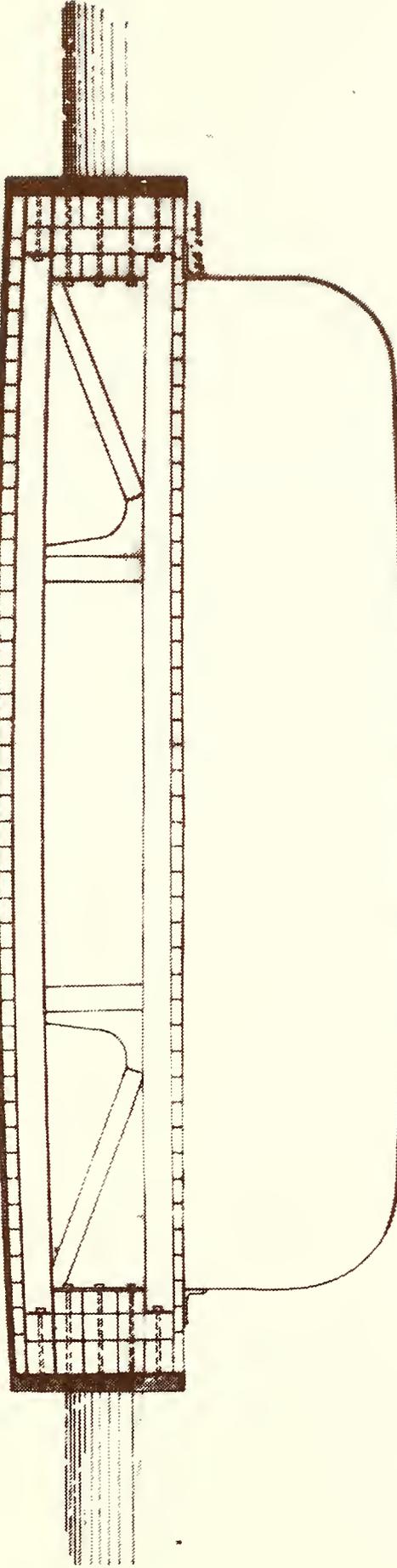
to, breadth of projectile, diameter

of barrel, height of projectile

to, diameter of projectile

to, diameter of projectile

to, diameter of projectile



*Ball when firing into section was measured 25 lbs.
Harrison's gun was 2 feet 6 inches in diameter of barrel
and projected 2 feet 6 inches.*

APPENDIX C

Index of Drawings by Source

ORGANIZATIONS

American-Swedish Historical Foundation Museum

Nos. 14, 43, 70, 142, 149, 159.

Archives du Ministère des Affaires Étrangères

No. 23.

Mariners Museum

Nos. 35, 36, 48.

New York Historical Society

No. 32.

Stevens Institute of Technology

Nos. 13, 41, 44, 54, 62, 68, 69, 71, 81, 88, 101, 104, 105, 106, 107, 108, 109, 110, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 133, 134, 135, 136, 137, 138, 139, 140, 141, 152, 154, 155, 156, 157, 158, 160, 161, 164, 165, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 187, 188, 191, 192, 193, 194, 195

National Archives

Record Group 19:

Nos. 6, 8, 33, 34, 206.

Record Group 45:

Nos. 3, 4, 7, 30, 51, 151.

Record Group 46:

No. 207

Record Group 71:

Nos. 58, 65, 91, 150, 153, 183.

Record Group 74:

Nos. 183, 186, 196, 197, 198, 199, 200, 201, 202, 203.

Naval Academy Museum

Nos. 19, 20.

Naval Historical Center

No. 204.

Naval Research Laboratory

No. 147.

Smithsonian Institution

Chester Griswold Collection

Nos. 57, 143, 144, 145, 146, 148.

Krigsarkivet Collection

Nos. 24, 42, 100, 163.

INDIVIDUAL COLLECTIONS

Robert Rowland Coykendall
Nos. 15, 17, 47, 90.

Thomas Fitch Rowland, Jr.
Nos. 9, 10, 11, 12, 16, 45, 46, 52, 53, 55, 56, 59, 60, 61, 63, 64, 66, 67, 72, 73, 74,
75, 76, 77, 78, 79, 80, 82, 83, 84, 85, 86, 87, 89, 92, 93, 94, 95, 96, 97, 98, 99,
131, 132, 166, 189, 190.

Dana M. Wegner
Nos. 39, 40.

PUBLICATIONS

Allenson, George. "The Monitor," *Model Craftsman*, 5, (February, 1937)
Nos. 37, 38, 111, 162.

Bennett, Frank M. *The Steam Navy of the United States*, Pittsburgh: Warren and Company,
1896.
Nos. 28, 103.

Church, William Conant. "John Ericsson, The Engineer," *Scribner's Magazine*, VII, (January-
June, 1890).
Nos. 1, 2.

Ericsson, John. "The Building of the 'Monitor'," in R.U. Johnson and C.C. Buel, eds. *Battles
and Leaders of the Civil War* New York: Century Company, 4 volumes, 1887.
Nos. 29, 31, 49, 50.

_____. *Contributions to the Centennial Exhibition* New York: "Nation" Press, 1876.
Nos. 5, 26, 112, 113, 114, 205.

Greene, S. Dana. "In the 'Monitor' Turret," in R.U. Johnson and C.C. Buel, eds. *Battles and
Leaders of the Civil War* New York: Century Company, 4 volumes, 1887.
No. 27

Harper's Weekly
December 21, 1861
No. 18
March 29, 1862
No. 21

Isherwood, B.F. *Experimental Researches in Steam Engineering* Philadelphia: Hall of the Franklin Institute, Volume 1, 1863.
No. 102

Russell, John Scott. *Modern System of Naval Architecture* London: Day and Son, Volume 3, 1863.
No. 25

U.S. Navy Department. *Ordnance Instructions for the United States Navy* Washington: Government Printing Office, 1866.
No. 185

Warner, Oliver. *Great Sea Battles* New York: Macmillan Company, 1963.
No. 22

APPENDIX D

Index of Drawings by Draftsmen

Sumner Bradford Besse

Nos. 35, 36

Charles H. Corbett

No. 32

Endicott and Company

No. 159

John Ericsson

Nos. 1, 2, 9, 54, 59, 62, 63, 71, 88, 90, 104, 106, 107, 108, 109, 115, 116, 125, 127, 128, 133, 137, 141, 142, 143, 144, 148, 150, 152, 154, 155, 156, 158, 164, 167, 169, 171, 172, 173, 176, 177, 178, 179, 180, 181, 186, 187, 188, 192, 193, 204.

Gantie

No. 23

William F. Keeler

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THE MONITOR NATIONAL MARINE SANCTUARY

On January 30, 1975 the one-mile-diameter area around the wreck site of the Civil War ironclad, U.S.S. *Monitor*, was designated the *Monitor* National Marine Sanctuary by the Secretary of Commerce pursuant to *Title III of the Marine Protection, Research and Sanctuaries Act of 1972*. The Sanctuary Programs Division, National Ocean Service of the National Oceanic and Atmospheric Administration has been delegated the authority for the development and administration of research and management programs for the *Monitor* National Marine Sanctuary as a component of the National Marine Sanctuary Program.

In fulfilling the goals of the Program and recognizing the *Monitor* as an irreplaceable and non-renewable cultural resource of national significance, the administration of the *Monitor* National Marine Sanctuary has established objectives to protect and preserve the *Monitor* and all of its associated records and archaeological collections; ensure the systematic recovery and dissemination of historical and cultural information preserved at the *Monitor* site; preserve and develop the physical remains of the *Monitor* to enhance the significance and interpretive potential of the warship's remains; and enhance the public's awareness and understanding of the *Monitor* as a historical and cultural resource by providing interpretive educational resources and materials.

As part of this latter objective, reports are published under this Program in *Technical and Historical Series* describing technical analyses of the configuration, deterioration, recovery techniques and explorations of the wreck site and historical documentation related to the *Monitor's* naval architecture, records, correspondence and crew, respectively. For further information on the *Monitor* National Marine Sanctuary and its reports, write to:

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